Think Academy

Jolly Math

Grade 5

Think Academy US ONLINE

Upper Elementary Math Program

Think Academy Elementary Math Program is designed for K to Grade 5 students, offering a professional, systematic, and comprehensive year-round curriculum based on North American learning standards. The program is divided into two main systems:**School Curriculum Track and Competition Track.**

- The School Curriculum Track is divided by students' progress and ability:
  - Core+：Aligned with school curriculum; with solid foundations and steady improvement
  - Honors：One year ahead; consistent A grades and readiness for accelerated programs
  - Challenge：1.5–2 years ahead; full mastery of AP-level math with moderate enrichment

1–2 years ahead of Common Core, aligning with both private school entrance exams (MAP, ISEE, SSAT) and public school assessments (STAR Math, i-Ready, IOWA, SBA, etc.), ensuring students maintain a strong academic edge.

- The Competition Track is divided by thinking flexibility and concept mastery:
  - ACE：Builds competition foundations, strengthens problem-solving skills, and helps Grade 5 students reach AMC 8 Honor Roll
  - ACE+：Intensive training for advanced Olympiad pathways and higher-level competitions

Covers core knowledge points from Math Kangaroo (Grades 1–4) and AMC 8 (Grades 4–8), develops both reasoning and competition skills, promoting excellence in school academics and contests for long-term growth.!

The tiered class structure ensures every student finds a fit. All cover the seven core modules of elementary mathematics—Computation, Geometry, Number Theory, Applications, Counting and Probability, Algebra, and Combinatorics—**with differences only in pace and depth.**

	Elementary School									Middle School		
Grade	G3			G4			G5			G6		
Semester	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring
Core+	Math 3			Math 4			Math 5			Math 6		
Honors	G3 Honors			G4 Honors			G5 Honors			Pre-Algebra		
Challenge	G3 Challenge			G4 Challenge			G5 Challenge			Algebra 1		Intro to Geometry
ACE	G3 ACE			G4 ACE			G5 ACE			AMC8 HR		AMC10 Intro

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Middle School Competition Track Student Results

2022-2024 AMC8 Number of Students Awarded:

456
Achievement Roll
(Lower Grade Achievement Award)

397
Honor Roll
(National Top 5%)

134
DHR
(National Top 1%)

2022-2024 AMC10 Number of Students Awarded:

304
AIME Qualification
(National Top 7%)

187
Honor Roll
(National Top 5%)

45
DHR
(National Top 1%)

2024 Think Global IMO Award Winner

7 Golds 1 Silver

Ranked first globally in total gold medals.

International Mathematical Olympiad
Foundation Bronze Sponsor

Think Academy is an official partner of the International Mathematical Olympiad (IMO)

Why Think Academy Competition Courses Trained Thousands of Award-Winning Students?

1 One-Stop Professional System for Math Competitions

Think Competition follows the AMC syllabus and aligns with students' learning pace. **Grades 5–6 focus on AMC 8**, while **Grades 7–8 focus on AMC 10**. The curriculum covers the four core modules of math competitions — Algebra, Geometry, Number Theory, and Counting & Probability — enabling students to achieve one competition milestone each year and **complete AMC 10 preparation before high school, successfully qualifying for AIME**.

2 Expert Coaches. Top Results. Proven Success.

Think Competition courses are taught by **instructors with many years of competition teaching experience**, enabling students to master complex contest concepts efficiently and with ease.

James
Upenn - 5 YOE

Dennis
Duke - 4 YOE

Yichen
Columbia - 4 YOE

3 Collaborate and Excel with Outstanding Peers

Each year, the Competition Track begins with an entrance assessment to ensure students learn alongside peers of similar ability. This structure makes preparation more engaging and collaborative, as students motivate one another and grow together throughout the journey.

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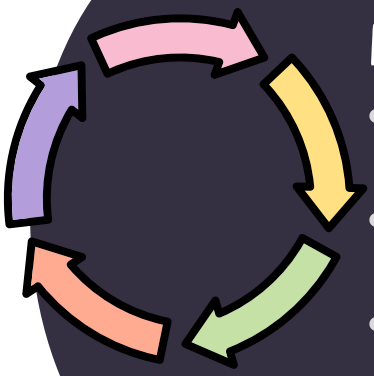
Course Highlights

Clear Structure, Worry-Free for Parents

Personalized Learning Plans with Full Progress Tracking

- **Before Enrollment:** Teachers create **personalized study plans** based on each student' s goals and ability
- **During Learning:** Teachers give **regular feedback and targeted advice**, helping parents track progress
- **Mid-Term & Final Evaluations**: **Parent meetings** and updated study plans ensure steady improvement



Weekly Learning Cycle to Ensure Steady Progress

- **Pre-Class Preparation: 15-minute preview** to review key concepts and prepare for new lessons
- **Homework: Assigned after each class**, with teacher feedback shared with parents
- **Office Hour: Free live sessions** to review and clarify difficult problems
- **Homework Review Videos:** Each homework question includes a **detailed video explanation** for easy review

Year-Round Learning Support

- **Year-round Parent App service** providing fast responses
- Through the Parent App, parents get **direct contact with teachers** for efficient communication and real-time progress updates
- Instant online homework help for **timely learning support**

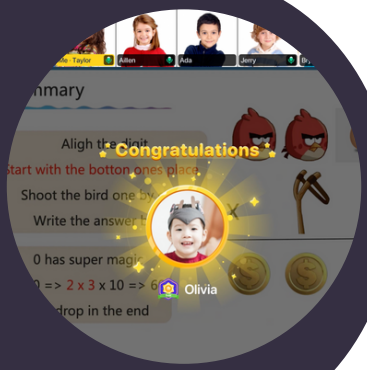
Think Academy US Online

Course Highlights

Happy Learning, Better Results

Thoughtfully Crafted Lessons Inspire a Love for Math

- **Interactive games and scenario-based teaching** make math fun and engaging
- **Gold coin reward system** lets students exchange coins for prizes, motivating them to complete learning tasks actively



Self-Developed Learning App Enhances Every Online Class

- **Think Academy learning app** enhances in-class interaction with hand-raising, polls, and group activities —**keeping students engaged every three minutes**
- Teachers **track progress in real time** for an effective learning experience

A Sense of Achievement Builds Intrinsic Motivation

- Students learn efficiently in class and get **full after-class support** with detailed homework videos and free weekly Office Hours.
- Students **gain higher grades, faster progress**. They are naturally motivated to put more effort in STEM learning and become **confident math learners**

Contents

Basic Math 1

Mixed Operation / 2

Equation / 33

Geometry / 65

Word Problems / 89

Advanced Math 116

Complex Operation & Equation / 117

Geometry / 175

Word Problems / 185

Combinatorics / 209

Crazy Math 234

AMC 8 / 235

Think One on One / 255

Think Cup / 271

Basic Math

Mixed Operation

Decimals

1 1. When calculating $0.01 \times 1,000$, each digit of 0.01 moves _____ places to the left, and we can get the result _____ .

2. When calculating $1,000 \div 10,000$, each digit of $1,000$ moves _____ places to the right, and we can get the result _____ .

2 When calculating 0.78×1000, each digit of 0.78 moves _____ place(s) to the _____ , and we get the result _____ .

A. two; left; 07.8
B. three; left; 780
C. two; right; $.078$
D. three; left; 0.078
E. three; right; 0.0078

3 Calculate:

(1) $9.99 \times 10 =$ _____

(2) $3.29 \times 100 =$ _____

(3) $10.01 \times 10 =$ _____

(4) $88.9 \times 1000 =$ _____

4 Calculate:

(1) $5.793 \times 10 =$ _____

(2) $1.2 \times 100 =$ _____

(3) $12.86 \times 10 =$ _____

(4) $67.3 \times 1000 =$ _____

5 Calculate:

(1) $6.83 \times 10 =$ _____

(2) $1.9 \times 100 =$ _____

(3) $96.69 \times 10 =$ _____

(4) $17.9 \times 1000 =$ _____

6 Calculate:

(1) $0.3 \div 100 =$ _____

(2) $2 \div 1,000 =$ _____

(3) $0.03 \div 10 =$ _____

(4) $6 \div 1,000 =$ _____

7 Calculate:

(1) $12.4 + 7.63 =$ _____

(2) $90 - 79.6 =$ _____

(3) $35.14 - 29.76 =$ _____

(4) $34.7 \times 0.7 =$ _____

8 Calculate:

(1) $1.3 \times 4 =$ _____

(2) $3.62 \times 5 =$ _____

(3) $2.4 \times 7 =$ _____

(4) $12.85 \times 3 =$ _____

9 Use long division to calculate:

(1) $100.8 \div 9 =$ _____

(2) $46.4 \div 4 =$ _____

Fractions & Decimals

1 Choose the right answer:

$0.125 =$ _____ $=$ _____ $\div$ _____

A. $\frac{1}{8}$; 1; 8

B. $\frac{1}{2}$; 1; 2

C. $\frac{1}{4}$; 1; 4

D. $\frac{3}{4}$; 3; 4

2 Write the following fractions as decimals.

(1) $\frac{24}{25}$ = _____

(2) $\frac{27}{40}$ = _____

(3) $1\frac{1}{4}$ = _____

(4) $1\frac{2}{5}$ = _____

3 Write the following decimals as proper fractions or mixed numbers in the simplest form.

(1) 0.75 = _____

(2) 2.63 = _____

(3) 7.65 = _____

(4) 1.38 = _____

4 Write the followings as decimals.

(1) $\frac{2}{5}$ = _____

(2) $\frac{3}{8}$ = _____

(3) $\frac{5}{4}$ = _____

(4) $21\frac{9}{10}$ = _____

(5) $2\frac{8}{25}$ = _____

(6) $9\frac{7}{8}$ = _____

5 0.25 = _____ = _____ ÷ _____

A. $\frac{1}{4}$; 1; 4

B. $\frac{1}{2}$; 1; 2

C. $\frac{2}{5}$; 2; 5

D. $\frac{3}{4}$; 3; 4

6 Write the followings as decimals.

(1) $\frac{7}{8}$ = _____

(2) $\frac{7}{5}$ = _____

(3) $7\frac{3}{4}$ = _____

(4) $17\frac{1}{8}$ = _____

(5) $3\frac{13}{25}$ = _____

(6) $9\frac{17}{50}$ = _____

7 Write the followings as proper fractions or mixed numbers in the simplest form.

(1) 0.6 = _____

(2) 0.22 = _____

(3) $2.58 =$ _____

(4) $3.36 =$ _____

(5) $11.25 =$ _____

(6) $10.88 =$ _____

8 Write the following fractions as decimals.

$\frac{13}{5} =$ _____ .

$\frac{7}{4} =$ _____ .

$\frac{11}{8} =$ _____ .

9 Write the following fractions as decimals.

$\frac{17}{25}$ = _____ .

$\frac{19}{8}$ = _____ .

$\frac{11}{40}$ = _____ .

10 Write the following fractions as decimals.

$\frac{9}{25}$ = _____ .

$\frac{9}{4}$ = _____ .

$\frac{17}{8}$ = _____ .

Roots

1 Calculate:

(1) $\sqrt{16}$= _____

(2) $\sqrt{25}$= _____

(3) $\sqrt{9}$= _____

(4) $\sqrt{49}$= _____

2 Calculate:

(1) $\sqrt{81}$= _____

(2) $\sqrt{121}$= _____

(3) $\sqrt{169}$= _____

(4) $\sqrt{64}$= _____

3 Calculate:

(1) $\sqrt{2^2}=$ _____

(2) $\sqrt{(-2)^2}=$ _____

(3) $\sqrt{(-3)^4}=$ _____

(4) $\sqrt{3^2}=$ _____

4 Calculate:

(1) $\sqrt[3]{2^3}=$ _____

(2) $\sqrt[3]{27}=$ _____

(3) $\sqrt[4]{16}=$ _____

(4) $\sqrt[5]{(-32)}=$ _____

5 Calculate:

(1) $\sqrt{72}$= _____

(2) $\sqrt{48}$= _____

(3) $\sqrt{45}$= _____

(4) $\sqrt{108}$= _____

6 Calculate:

(1) $\sqrt{12}$= _____

(2) $\sqrt{32}$= _____

(3) $\sqrt{64}$= _____

(4) $\sqrt{27}$= _____

7 Calculate:

(1) $\sqrt{16} + \sqrt{25} =$ _____

(2) $\sqrt{25} - \sqrt{16} =$ _____

(3) $\sqrt{9} + \sqrt{81} =$ _____

(4) $\sqrt{49} - 3 =$ _____

8 Calculate:

(1) $\sqrt{16} + \sqrt{36} =$ _____

(2) $\sqrt{36} - \sqrt{16} =$ _____

(3) $\sqrt{64} + \sqrt{81} =$ _____

(4) $\sqrt{25} - \sqrt{1} =$ _____

9 Calculate:

(1) $\sqrt{12} + \sqrt{27} =$ _____

(2) $\sqrt{180} - \sqrt{20} =$ _____

(3) $\sqrt{54} + \sqrt{24} =$ _____

(4) $\sqrt{49} - \sqrt{4} =$ _____

10 Calculate:

(1) $\sqrt{8} + \sqrt{18} =$ _____

(2) $\sqrt{18} - \sqrt{8} =$ _____

(3) $\sqrt{27} + \sqrt{3} =$ _____

(4) $\sqrt{27} - \sqrt{3} =$ _____

Negative Numbers

1 Calculate:

(1) $(-4) + 7 =$ _____

(2) $3 - 5 =$ _____

2 Calculate:

(1) $(-2) \times 3 =$ _____

(2) $(-6) \times (-3) =$ _____

3 Calculate:

(1) $(-3) \times 3 =$ _____

(2) $-(-3) \times 3 =$ _____

(3) $(-3) \times (-3) =$ _____

4 Calculate:

(1) $5 + (-6) =$ _____

(2) $-8 - (+3) =$ _____

(3) $(-11) - 7 =$ _____

(4) $(-7) - (-8) =$ _____

5 Calculate:

(1) $(-8) - 8 =$ _____

(2) $(-8) - (-8) =$ _____

(3) $8 - (-8) =$ _____

(4) $8 - 8 =$ _____

6 Calculate:

(1) $0 - 6 =$ _____

(2) $0 - (-6) =$ _____

(3) $16 - 47 =$ _____

(4) $28 - (-74) =$ _____

7 Calculate:

(1) $3 - 4 =$ _____

(2) $-4 + 3 =$ _____

(3) $-4 - 3 =$ _____

(4) $-4 + (-3) =$ _____

(5) $-4 - (-3) =$ _____

8 Calculate:

(1) $-150 + 250=$ _____

(2) $-15 + (-23)=$ _____

(3) $-5 - 65=$ _____

(4) $-26 - (-15)=$ _____

9 Calculate:

(1) $(-1.3) + (-1.7)=$ _____

(2) $(-11) - 7=$ _____

(3) $(-7) - (-8)=$ _____

(4) $(+5) - (-3) + (-7)=$ _____

10 Calculate:

(1) $-6 \times (-16) =$ _____

(2) $-\frac{1}{3} \times 27 =$ _____

(3) $8 \div (-16) =$ _____

(4) $-25 \div \left(-\frac{2}{3}\right) =$ _____

11 Calculate:

(1) $(-17) + (-85) =$ _____

(2) $(-147) + (-276) =$ _____

(3) $(-28) + 9 =$ _____

(4) $-26 + (+90) =$ _____

(5) $(-54) + 19 =$ _____

(6) $(-192) + 24 =$ _____

12 Calculate:

(1) $(-2) \times 3 \times 4 \times (-1) =$ _____

(2) $(-5) \times (-3) \times 4 \times (-2) =$ _____

(3) $(-2) \times (-2) \times (-2) \times (-2) =$ _____

Exponents

1 Calculate:

(1) $31^2 =$ _____

(2) $32^2 =$ _____

(3) $44^2 =$ _____

(4) $45^2 =$ _____

2 Calculate:

(1) $2^3 =$ _____

(2) $3^2 =$ _____

3 Calculate:

(1) $3^2 =$ _____

(2) $(-3)^2 =$ _____

(3) $-3^2 =$ _____

4 Calculate:

$6^3 =$ _____

$5^2 =$ _____

$2^3 =$ _____

$3^2 =$ _____

5 Calculate:

(1) $6^2 - (-2)^2 =$ _____

(2) $(-6)^2 - 2^3 =$ _____

(3) $(-6)^2 - (-2)^3 =$ _____

(4) $(-3)^3 - 3^2 =$ _____

6 Calculate:

(1) $-1^2 =$ _____

(2) $-1^{99} =$ _____

(3) $(-1)^{2019}$ = _____

(4) $(-1)^{2020}$ = _____

7 Calculate:

31^2 = _____

38^2 = _____

44^2 = _____

45^2 = _____

62^2 = _____

88^2 = _____

11^2 = _____

111^2 = _____

1111^2 = _____

11111^2 = _____

8 Calculate:

(1) $(-12) - 5 + (-18) - (-35)$ = _____

(2) $-1^4 - 8 \div (-2)^3 + 2^2 \times (-3) =$ _____

9 Calculate:

(1) $4^2 - (-2)^3 =$ _____

(2) $5^2 - 2^3 =$ _____

(3) $(-5)^2 - (-2)^2 =$ _____

(4) $(-4)^2 - 2^2 =$ _____

10 Calculate:

(1) $2^3 =$ _____

(2) $2^4 =$ _____

(3) $2^5 =$ _____

(4) $2^6 =$ _____

(5) $2^7 =$ _____

(6) $2^8 =$ _____

(7) $2^9 =$ _____

(8) $2^{10} =$ _____

11 Calculate:

(1) $3^2 - (-2)^2 =$ _____

(2) $3^2 - 2^2 =$ _____

(3) $(-3)^2 - (-2)^2 =$ _____

(4) $(-3)^2 - 2^2 =$ _____

12 Calculate:

(1) $3^2 - (-2)^3 =$ _____

(2) $3^3 - 2^2 =$ _____

(3) $(-3)^3 - (-2)^2 =$ _____

(4) $(-3)^3 - 2^2 =$ _____

13 Calculate:

(1) $6^2 - (-3)^3 =$ _____

(2) $(-3)^3 - 2^4 =$ _____

(3) $(-5)^2 - (-2)^3 =$ _____

(4) $(-4)^3 - 4^2 =$ _____

14 Calculate:

(1) $2^3 - (-1)^3 =$ _____

(2) $2^3 - 1^3 =$ _____

(3) $(-2)^3 - (-1)^3 =$ _____

(4) $(-2)^3 - 1^3 =$ _____

15 Calculate:

(1) $11^2 =$ _____

(2) $12^2 =$ _____

(3) $13^2 =$ _____

(4) $14^2 =$ _____

(5) 15^2 = _____

(6) 16^2 = _____

(7) 17^2 = _____

(8) 18^2 = _____

(9) 19^2 = _____

(10) 21^2 = _____

(11) 22^2 = _____

(12) 23^2 = _____

(13) 24^2 = _____

(14) 25^2 = _____

16 Calculate:

(1) 2^3 = _____

(2) $(-2)^3$ = _____

(3) $-2^3 =$ _____

(4) $(-2)^{101} - 2 \times (-2)^{102} =$ _____

17 Calculate:

(1) $(-3)^4 =$ _____

(2) $-3^4 =$ _____

(3) $\left(-\frac{3}{2}\right)^3 =$ _____

(4) $-\frac{3^3}{2} =$ _____

NOTE

Equation

Basic Equation

1 Solve the equation
$x + 2 = 9$

2 Solve the equation
$x - 10 = 12$

3 Solve the equation
(1) $73 + x = 150$

(2) $68 - x = 14$

(3) $x - 50 = 25$

4 Solve the equation

(1) $x + 17 = 24$

(2) $x - 460 = 530$

5 Solve the equation

(1) $26 + x = 115$

(2) $x - 38 = 169$

(3) $x + 47 = 92$

6 Solve the equation

(1) $56 - x = 14$

(2) $x - (25 - 12) = 64$

7 Solve the equation

(1) $x + 409 = 655$

(2) $x - 4 = 7$

8 Solve the equation

(1) $x + 8 = 13$

(2) $25 + x = 53$

(3) $x - 40 = 15$

(4) $20 - x = 9$

9 Solve the equation

(1) $x + 25 - 10 = 27$

(2) $x - 24 + 76 = 500$

10 Solve the equation

(1) $x + 17 = 24$

(2) $x - 460 = 530$

(3) $27 + x = 75$

11 Solve the equation

$5x = 55$

12 Solve the equation

$6x = 24$

13 Solve the equation

$x \div 5 = 7$

14 Solve the equation

$2x + 23 \times 4 = 134$

15 Solve the equation

$3x + 9 = 195$

16 Solve the equation

$6x + 17 - 4x = 19$

17 Solve the equation

$10x = 6x + 24$

18 Solve the equation

$5x + 25x = 90$

19 Solve the equation

(1) $4x + 18 = 26$

(2) $x \div 6 = 4$

20 Solve the equation

(1) $280 + 7x = 490$

(2) $4x + 16 = 16$

(3) $8x - 42 = 22$

21 Solve the equation

(1) $6x = 156$

(2) $8a \div 2 = 4$

(3) $4x + 9 = 249$

22 Solve the equation

(1) $x \div 18 = 432$

(2) $35 = 5x$

23 Solve the equation

(1) $6x + 10 = 11x$

(2) $3x + 1 = 9 - x$

24 Solve the equation

(1) $5x + 7x = 36$

(2) $9x - 4x = 105$

(3) $7x + 4x - 3x = 23 + 41$

25 Solve the equation

(1) $7x + 3x = 90$

(2) $2x + 15 \times 2 = 48$

26 Solve the equation

(1) $2x - 2 \times 3 = 8$

(2) $66x - 50x = 640$

27 Solve the equation

(1) $3x - 4 \times 6 = 48$

(2) $6x + 8x = 14 \times 3$

28 Solve the equation

(1) $7x + 4 = 102$

(2) $25 \times 12 = 3x$

29 Solve the equation

(1) $y + 8 = 142$

(2) $5m - 4 = 36$

30 Solve the equation

(1) $4a = 32$

(2) $3x - 16 = 29$

31 Solve the equation

(1) $12x - 15 = 9$

(2) $2 + 3x = 11$

32 Solve the equation

(1) $13x + 65 = 169$

(2) $8x - 3x = 10$

33 Solve the equation

(1) $3x - 8 = 37$

(2) $x \div 48 = 25$

(3) $4x + 45 = 165$

34 Solve the equation

(1) $x - 76 = 124$

(2) $x \div 4 = 96$

(3) $4x + 13 = 129$

35 Solve the equation

(1) $2x + 3x = 60$

(2) $36x - 28x = 8$

(3) $100x - x = 198$

36 Solve the equation

(1) $26x = 78$

(2) $14x = 70$

(3) $x \div 12 = 5$

(4) $4x = 52$

37 Solve the equation

(1) $13x - 4x = 81$

(2) $6x - 8 = 4$

(3) $29 \times 2 + 3x = 94$

(4) $8x - 25 \times 3 = 5$

38 Solve the equation

(1) $90x = 45$

(2) $x \div 0.4 = 2.5$

(3) $40x = 240$

(4) $5 + 3x = 20$

(5) $4x \div 5 = 16$

39 $5x + 28 = 3x$, $x =$ _____ .

$7x - 39 = -6x$, $x =$ _____ .

$-4x + 36 = 2x$, $x =$ _____ .

$-2x - 45 = -5x$, $x =$ _____ .

40 $x + 23 = 44$, $x =$ _____ .

$x - 31 = 50$, $x =$ _____ .

$16x = 80$, $x =$ _____ .

$\frac{x}{3} = 12$, $x =$ _____ .

41 $8x + 8.2 = 6.1 + 11x$, $x =$ _____ .

$5x + 13 = 3 + 3.75x$, $x =$ _____ .

42 $4x + 34 = 18$, $x =$ _____ .

$3x - 2 = 19$, $x =$ _____ .

$-7x + 11 = 88$, $x =$ _____ .

$-2x - 13 = -15$, $x =$ _____ .

43 $13.3x - 5 = 10 + 3.3x$, $x =$ _____ .

$-1.1x + 18 = -6 + 3.7x$, $x =$ _____ .

44 $23x + 2 = 94$, $x =$ _____ .

$15 - 3x = 51$, $x =$ _____ .

$-13x = 91$, $x =$ _____ .

$\frac{x}{9} = 11$, $x =$ _____ .

45 $x + 27 = 49$, $x =$ _____ .

$x - 17 = 25$, $x =$ _____ .

$15x = 90$, $x =$ _____ .

$\frac{x}{7} = 8$, $x =$ _____

46 $-2x + 14 = 5x$, $x =$ _____ .

$-38 + 5x = -14x$, $x =$ _____ .

$-42 - 4x = 3x$, $x =$ _____ .

$-13x - 63 = -4x$, $x =$ _____ .

47 $12 - 8x = 28$, $x =$ _____ .

$\frac{4x}{3} + \frac{2}{3} = 6$, $x =$ _____ .

$11x + 23 = -10$, $x =$ _____ .

$16x - (-4) = 8$, $x =$ _____ .

Fractional Equation

1 $5x + 33 = 18$, $x =$ _____ .

$\frac{x}{3} - 2 = 9$, $x =$ _____ .

$-6x + 11 = 53$, $x =$ _____ .

$-6x - 13 = -31$, $x =$ _____ .

2 $\frac{11}{6}x + \frac{1}{4} = \frac{5}{12}$, $x =$ _____ .

$\frac{7}{6}x - \frac{3}{2}x = \frac{22}{3}$, $x =$ _____ .

3 $\frac{5}{3}x - \frac{3}{4} = \frac{3}{4}x + \frac{1}{12}$, $x =$ _____ .

$\frac{5}{2}x - \frac{7}{10}x = \frac{13}{20}$, $x =$ _____ .

4 $x + \frac{5}{8} = \frac{23}{24}$, $x =$ _____ .

$-\frac{13}{5}x = 26$, $x =$ _____ .

5 $\frac{5}{7}x - \frac{8}{21} = \frac{3}{14}$, $x =$ _____ .

$\frac{7}{18}x + \frac{7}{12}x = \frac{1}{9}$, $x =$ _____ .

6 $\frac{2}{3}x - \frac{3}{4} = \frac{1}{6}x + \frac{3}{2}$, $x =$ _____ .

$\frac{9}{5}x - \frac{7}{10}x = 2$, $x =$ _____ .

7 $\frac{7}{3}x - \frac{1}{2} = \frac{5}{6}$, $x =$ _____ .

$\frac{13}{12}x + \frac{3}{4}x = \frac{11}{3}$, $x =$ _____ .

8 $\frac{7}{6}x - \frac{7}{8} = \frac{5}{8}x + \frac{1}{3}$, $x =$ _____ .

$\frac{7}{4}x - \frac{3}{5}x = 2$, $x =$ _____ .

Equation with Percentage

1 Solve the equation
$19 - 120\%x = 7$

2 Solve the equation
$40\%x + 25\%x = 26$

3 Solve the equation

$$2x + 0.8 \times 75\% = \frac{4}{5}$$

4 Solve the equation

$$\frac{2}{3}x + 50\%x = 84$$

5 Solve the equation

$$x - 40\%x = 4220\%$$

6 Solve the equation

$30\%x = 18.6$

7 Solve the equation

$2x + 30\%x = 9.2$

8 Solve the equation

$6 \times 3 - 180\%x = 10.8$

9 Solve the equation

$40\%x + 34x = 688$

10 Solve the equation

$30 - 20\%x = 18$

11 Solve the equation

(1) $x \div \frac{5}{7} = 14$

(2) $10\%x + 0.2x = 4.2$

12 Solve the equation

(1) $45\%x + 36 = 54$

(2) $x - 32\%x = 34$

13 Solve the equation

(1) $8x - 75\% \times 5 = 0.25$

(2) $4 - 2x = 6\%$

14 Solve the equation

(1) $x \div \left(1 - \frac{1}{9} - 25\%\right) = 2\frac{1}{2}$

(2) $20\%x + 50\% - 15\%x = 1$

15 Solve the equation

(1) $30\%x + 30 = 75$

(2) $(1 + 10\%)x = 132$

16 Solve the equation

(1) $8.5 + 65\%x = 15$

(2) $0.5x + 25\% = 10$

17 Solve the equation

(1) $1 - 25\%x = \frac{1}{4}$

(2) $x - 75\%x = 3$

(3) $1 - 25\%x = \frac{4}{7}$

18 Solve the equation

(1) $\frac{2}{3}x + 25\%x = \frac{1}{6}$

(2) $18 + 120\%x = 30$

(3) $x \div 20\% = 600$

19 Solve the equation

(1) $1 - 90\%x = 0.8$

(2) $50\%x - \frac{5}{8} = \frac{1}{4}$

(3) $\frac{4}{5} + 80\%x = 1$

20 Solve the equation

(1) $4x + 40\%x = 70.4$

(2) $(1 - 60\%)x = 160 \times 25\%$

(3) $x - 20\%x = 48$

(4) $35\%x \div 5 = 1.4$

21 Solve the equation

(1) $60\%x + 25 = 40$

(2) $19 - 120\%x = 7$

(3) $x + 30\%x = 52$

(4) $x \div 0.6 = 60\%$

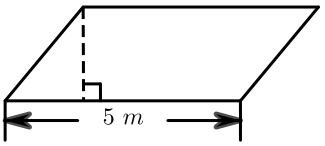
NOTE

NOTE

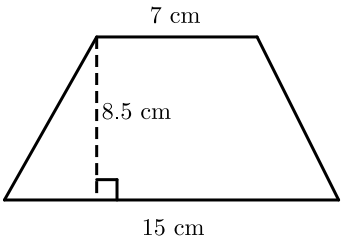
Geometry

Basic Area

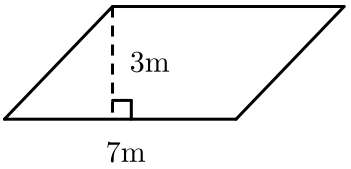
1 As shown in the figure below, the area of the parallelogram is 12 m^2. Find the length of its height marked in the figure.



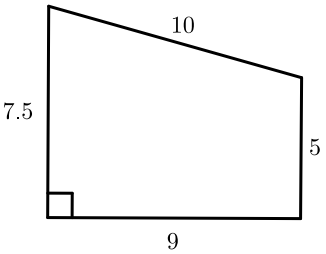
2 As shown in the figure below, find the area of the trapezoid.



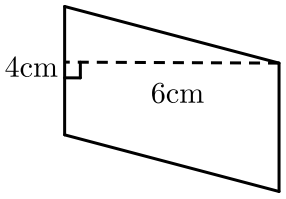
3 The area of the parallelogram is _____ m^2.



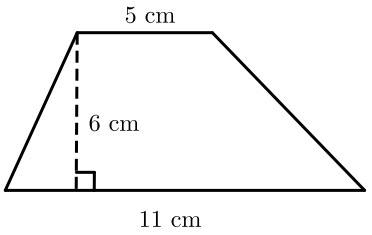
4 Find the area of the trapezoid below. (Unit: meters)



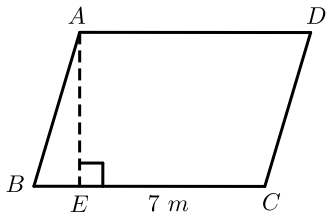
5 The area of the parallelogram is _____ cm^2.



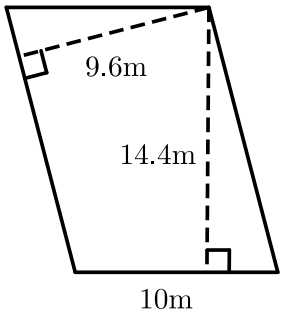
6 As shown in the figure below, if the top base of the trapezoid increases by 1 cm, and the bottom base decreases by 2 cm, find the area of the new trapezoid.



7 The area of the parallelogram below is 42 m^2, so the length of AE is _____ m.

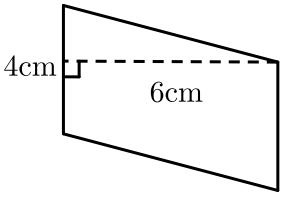


8 The area of the parallelogram is _____ m^2.

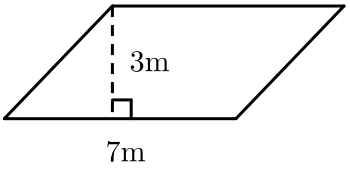


9 Calculate the area of each parallelogram below.

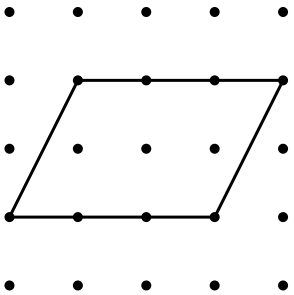
(1)



(2)

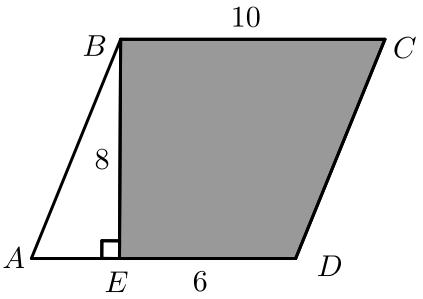


10 As shown below, the distance between any two adjacent points is 1. The area of the parallelogram is _____ .



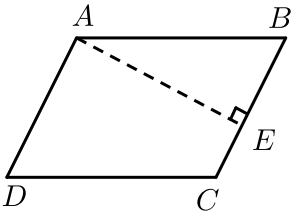
A. 6 B. 8 C. 12

11 The area of the shaded region $BEDC$ in parallelogram $ABCD$ is _____ .



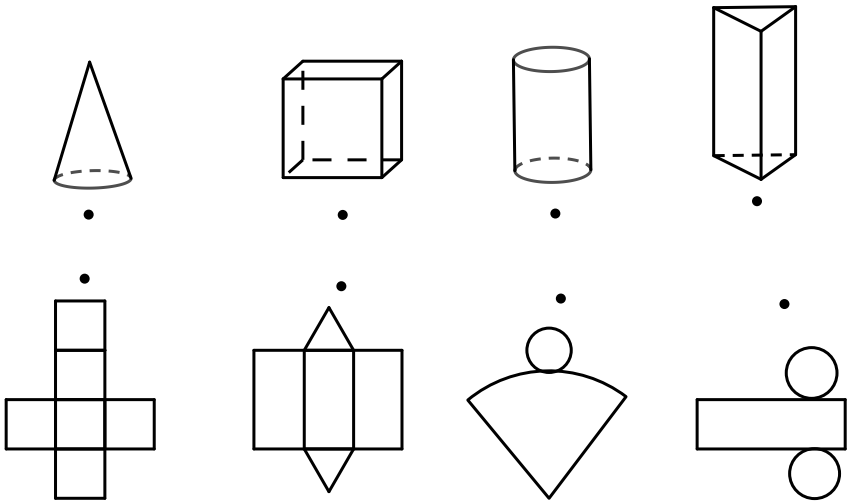
A. 24 B. 48 C. 60 D. 64 E. 80

12 The area of the parallelogram below is 48 cm^2, $AE = 8$ cm. What is the length of AD?

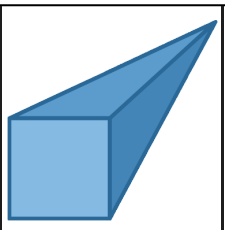
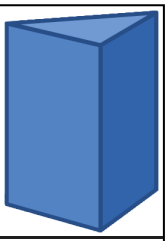


Knowing Cubes and Cuboids

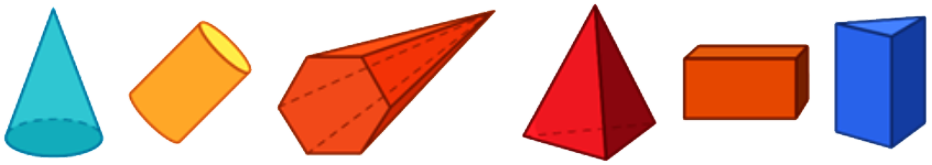
1 Match the corresponding figures with the nets.



2 Observe the figures below and fill the blanks.

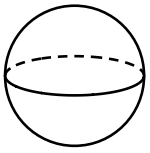
				
Number of Faces	____	____	____	____
Number of Edges	____	____	____	____

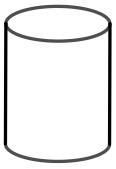
3 _____ is/are cylinder(s), _____ is/are pyramid(s).

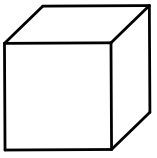


1 2 3 4 5 6

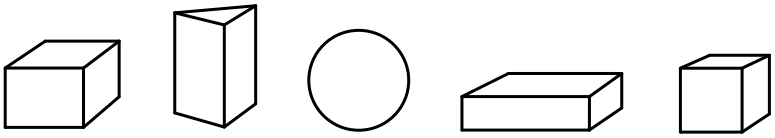
4 Which figure is a cylinder?

A. 

B. 

C. 

5 _____ is different from the other solids.



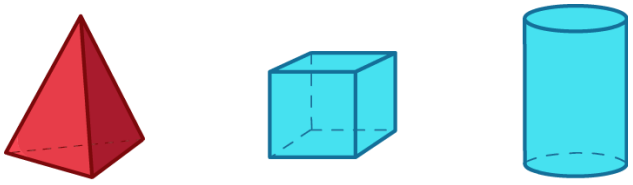
1 2 3 4 5

6 Observe the figures below and fill the blanks.

Figure ① has _____ faces, _____ edges.

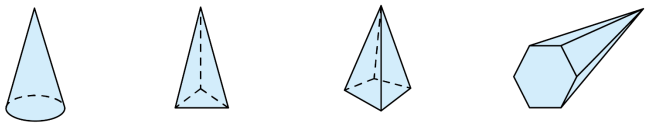
Figure ② has _____ faces, _____ edges.

Figure ③ has _____ faces, _____ edges.



① ② ③

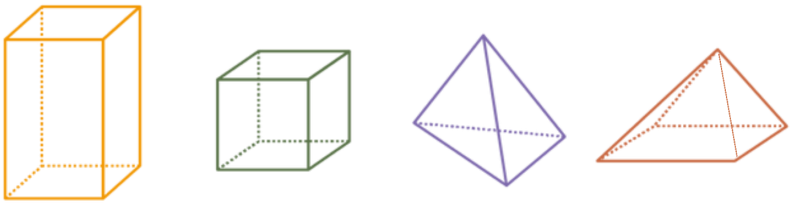
7 How many faces does each of the following figures have?



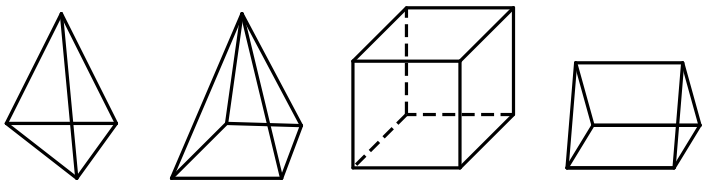
( ) ( ) ( ) ( )

8 A prism has 12 edges, how many vertices does this prism have?

9 How many vertices, faces, and edges does each of the following figures have?



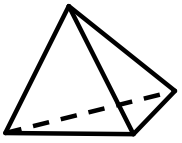
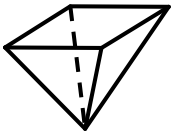
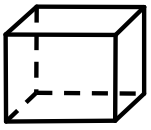
10 Observe the figures below and fill in the blanks.



(1) (2) (3) (4)

Figure	Number of Vertices	Number of Edges	Number of Faces
(1)			
(2)			
(3)			
(4)			

11 Fill in the blanks.

			
Number of faces			
Shape of the base			
Shape of the other faces			

12 Observe the figures below and fill in the blanks.

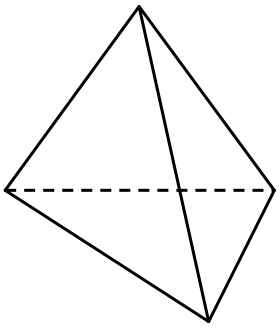
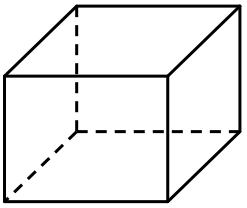
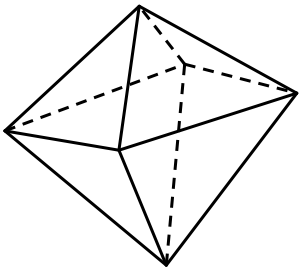
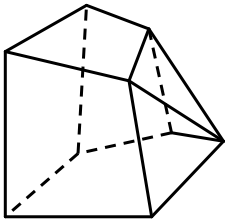
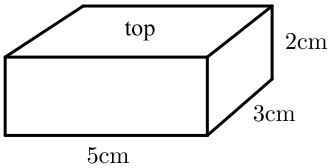
	
(1)	(2)
	
(3)	(4)

Figure	Number of Vertices	Number of Faces	Number of Edges
1			
2			
3			
4			

Surface Area and Volume of 3D Figure

1 Observe the cubiod below carefully. Answer the following questions.

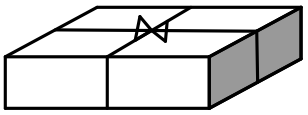


(1) The length of this cuboid is _____ cm, the width of it is _____ cm, and the height of it is _____ cm.

(2) The right face of the cuboid is _____ (shape), with the length of _____ cm, the width of _____ cm, and the area of _____ cm^2.

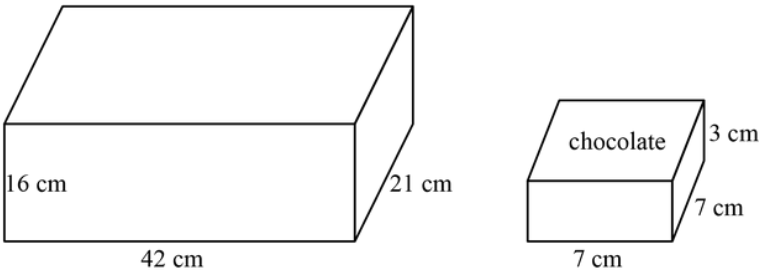
(3) The top face of the cuboid is _____ (shape), with the length of _____ cm, the width of _____ cm. The surface that is identical to it is _____ .

2 There is a kind of gift box, with the length of 25 cm, the width of 12 cm, the height of 8 cm, tied up like as shown below. If the bow of the ribbon is 30 cm in length, how many centimeters of the ribbon do we need to wrap a gift?



3 The length of the edge of a cube box is 6 cm. Packing this box needs _____ cm^2 of paper.

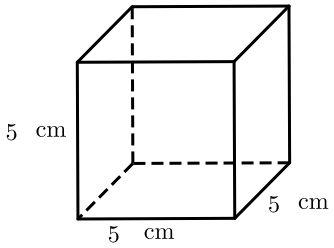
4 A market packages chocolate bars with a large rectangular carton. There are some small rectangular boxes inside the large rectangular carton. The picture below shows the sizes of the carton and the box.

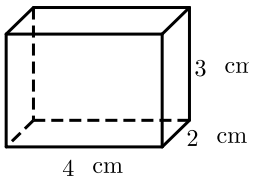


(1) What is the area of cardboard that is needed to make this big carton?

(2) What is the area of paper that is needed to make a small box?

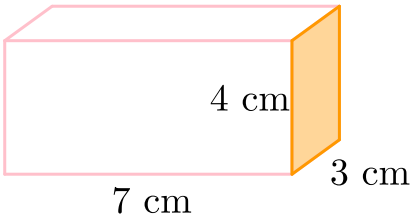
5 Find the surface area of the solid figures below.





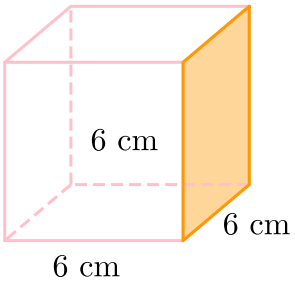
6 Calculate the volume of the following solid figures.

(1)



$V = abh = 7 \times 3 \times 4 =$ _____ cm^3

(2)

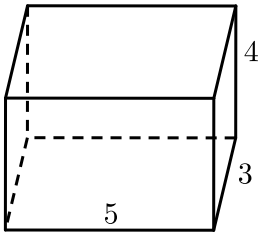


$V = a^3 = 6^3 = 6 \times 6 \times 6 =$ _____ cm^3

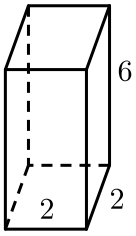
7 The length of the edge of Eva's cubic saving pot is 80 cm. The volume of the saving pot is _____ cm^3.

8 Find the volumes of the following rectangular prisms. (unit: cm)

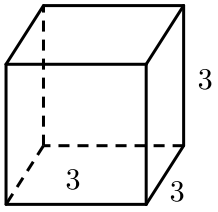
(1)



(2)

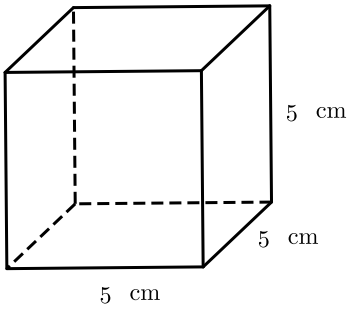


(3)

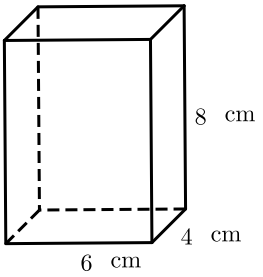


9 Find the volumes of the following solids.

(1)



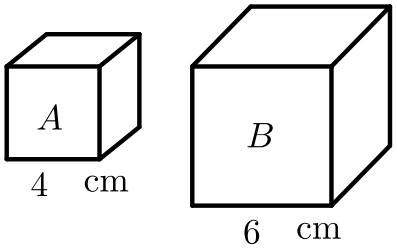
(2)



10 Cube A's edge : Cube B's edge = _____

Cube A's surface area: Cube B's surface area = _____

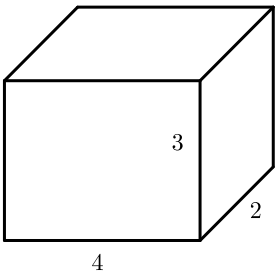
Cube A's volume : Cube B's volume = _____



11 Find the surface area and the volume of the solid figures below.

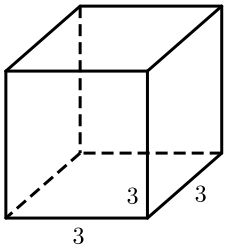
① (unit: m)

(1)



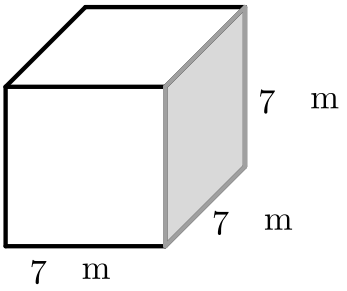
② (unit: m)

(2)



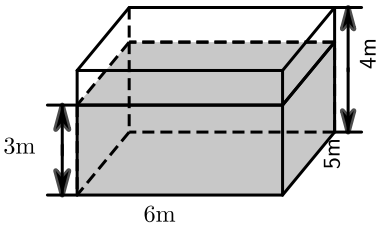
12 The surface area of a cubic box is $96\ \text{cm}^2$, then the volume of the box is _____ cm^3.

13 Find the surface area and the volume of the solid figure below.

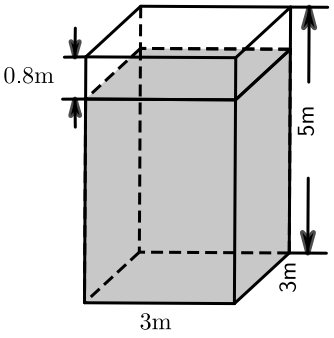


14 Calculate the volumes of the following containers and the volume of the liquid inside. (Ignore the container thickness.)

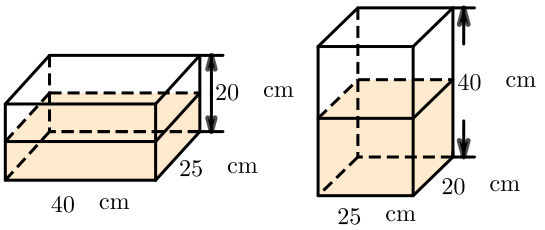
(1)



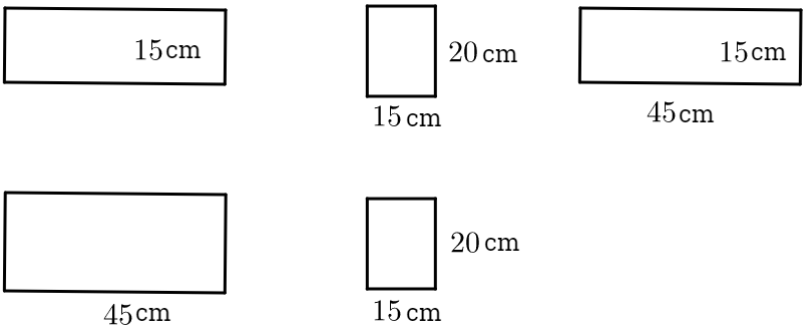
(2)



15 A glass container (the thickness of the container is not considered) is 40 cm in length, 25 cm in width, and 20 cm in height. When the container is laid flat, the height of the water inside is 10 cm. If the container is put upright, what is the height of the water in cm?



16 Use the five pieces of glass below to make a rectangular fish tank and calculate its volume.(The thickness of the glass is ignored.)



17 A cubic box with the edge length of 8 cm is completely filled with water. If $\frac{7}{16}$ of the water from the box is poured into another container, how much water in cubic centimeters is left in the box?

18 There is a cubic water tank. Measure it from the inside. The length of the edge of the tank is 40 cm. This water tank can contain at most _____ liters of water. (The thickness of the tank is ignored.)

A. 64000 B. 6400 C. 640 D. 64

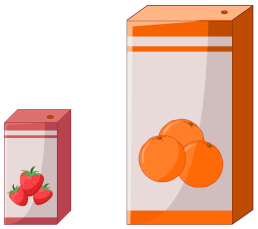
19 After putting a stone into the fish tank, The surface of the water rises $3\ \text{cm}$. If the area of the base of the fish tank is $51\ \text{cm}^2$, what is the volume of the stone?

20 A cubic box with the edge length of $3\ \text{cm}$ is completely filled with water. If $\frac{7}{27}$ of the water from the box is poured into another container, how much water in cubic centimeters is left in the box?

21 _____ bottles of identical cokes as shown below is 2 L.

250mL

22 There are two kinds of cuboid boxed drinks, beverage A and B. Beverage A's base area is $24\ \text{cm}^2$ and the height is 10 cm. Beverage B's base area is $50\ \text{cm}^2$ and the height is 20 cm.



Beverage A Beverage B

There is a large cuboid water bottle of which the base area is $400\ \text{cm}^2$ and the height is 15 cm. April is going to pour beverage into the bottle.

(1) If April pours all the beverage A into the bottle, the height of liquid in the bottle is _____ cm.

(2) If April pours all the beverage B into the bottle, the height of liquid in the bottle is _____ cm.

NOTE

Word Problems

Knowing Units

1. Building A is 40.75 m tall and Building B is 320 cm taller than Building A. What is the height of Building B in m?

2. A wire is 1 meter long. When 23 centimeters of it are used, there are _____ centimeters left.

3. There are 56.7 kilograms of apples in the storage. What is the weight of these apples in grams?

4 There are 23.3 kilograms of pumpkin in the storage. What is the weight of the pumpkin in grams?

5 Building A is 42.55 m tall and Building B is 110 cm shorter than Building A. What is the height of Building B in m?

6 The distance between A and B is 5230 meters. What is the distance between A and B in kilometers?

Word Problems with Fractions and Decimals

1. There are 20 boxes of electric wire in a hardware store. Each box contains electric wire of 4.2 meters. The unit price of the electric wire is 0.2 dollars per meter. What is the total price of all boxes of electric wire in the hardware store?

2. There are 6 groups of monkeys collecting coconuts and 10 monkeys in each group. They collected 21.6 kilograms of coconuts in total in a day. Each monkey collects the same amount of coconuts in a day. How many kilograms of coconuts did each monkey collect in a day?

3 There are 12 villages in Wonder Town. Each village has 100 people. Each person drinks 1.2 gallons of water today. All people in Wonder Town drink _____ gallons of water in total today.

4 Molly bought 8.875 kilograms of bananas and 3.325 kilograms of peaches. What was the total weight of fruits that Molly bought? Rewrite the answer as fraction or mixed number in the simplest form.

5 Cici has 12.6 dollars and Gigi has 9.75 dollars. How much does Cici have more than Gigi? Rewrite the answer as fraction or mixed number in the simplest form.

6 Jennifer made 3.75 liters of bubble tea and 1.375 liters of coffee. What was the total amount of drinks Jennifer made? Rewrite the answer as fraction or mixed number in the simplest form.

7 Irene only has 5.375 pounds of salmon and 8.375 pounds of shrimp in the fridge. What is the total weight of seafood that Irene has in the fridge? Rewrite the answer as fraction or mixed number in the simplest form.

8 There are 30 boxes of screws in a hardware store. Each box contains 120 screws. The unit price of a screw is 0.2 dollars. What is the total price of all boxes of screws in the hardware store?

9 There are 3 groups of squirrels collecting hazelnuts and 2 squirrels in each group. They collected 10.8 kilograms of hazelnuts in total in a day. Each squirrel collects the same amount of hazelnuts in a day. How many kilograms of hazelnuts did each squirrel collect in a day?

10 Mom ate $\frac{2}{5}$ kg of yogurt and I ate 0.6 kg of yogurt. Mom and I ate _____ kg of yogurt in total.

11 Pucky bought 3.125 kilograms of bananas and 9.125 kilograms of watermelons. What was the total weight of fruits that Pucky bought? Rewrite the answer as fraction or mixed number in the simplest form.

12 Gigi has $8\frac{1}{8}$ dollars and Kiki has 15.75 dollars. How much does Kiki have more than Gigi? Rewrite the answer as both decimal and fraction.

13 Jimmy only had $3\frac{3}{4}$ kg of beef and $2\frac{2}{5}$ kg of lamp. What was the total amount of meat that Jimmy had? Rewrite the answer as decimal.

14 Nina rides for 5.5 km to go to school everyday while Klaus rides for $10\frac{3}{8}$ km to go to school everyday. Klaus rides for _____ km more than Nina everyday (write the answer as decimal).

15 The area of a test paper is close to ( ).

A. 11 square meter

B. 1100 square centimeter

C. 11 square centimeter

D. 11 square millimeter

16 There are 40 boxes of screws in a hardware store. Each box contains 80 screws. The price of a screw is 0.3 dollars. What is the price of all boxes of screws in the hardware store in total?

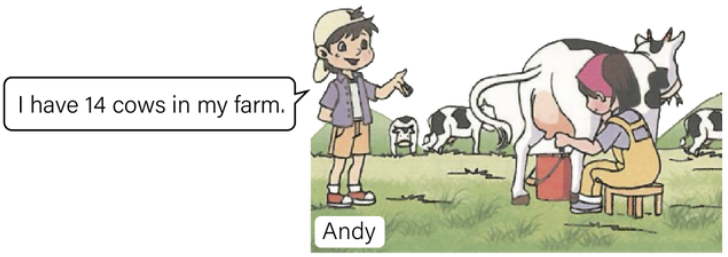
17 There is a rectangular lawn in a garden. It is 4.5 meters wide and the length is twice as long as the width. So what is the area of this lawn?

18 There are 3 groups of workers cutting wood and there are 4 workers in each group. All those workers cut 20.4 kilograms of woods totally a day. Each worker cut the same amount of woods. How many kilograms of woods did each worker cut in a day?

19 A car consumes about 1 liter of petrol to run 2 km. How many liters of petrol does it take to drive 10.6 km?

20 Aimee is going to travel with her mother. The baggage allowance is 10 kg, and the weight of her mother's baggage is $7\frac{2}{5}$ kg. The maximal weight of Aimee's baggage is _____ kg in order to avoid paying extra money.

21 A cow can produce 29 kg of milk per day. How many kilograms of milk does Andy's cow produce per day?



22 A acre of forest releases about 0.73 tons of oxygen per day. How many tons of oxygen does 4.3 acres of forest release in a month? (Round to the tenths digit)

Word Problems with More Steps

1. There are a total of 67 workers in a workshop. The number of male workers is 13 less than that of female workers. Suppose the number of male workers is x. We can write the number of female workers as _____ . Using this equation, we can get that there are _____ male workers and _____ female workers.

2. There are 37 students in the class. The number of boys is 5 greater than the number of girls. Suppose the number of boys is x. We can then write the number of girls as _____ . Using this equation, we can get that there are _____ boys and _____ girls.

3 A car can run 120 miles consuming 3 gallons of gas. How much gas does it consume to run 400 miles?

4 Simon drinks the same amount of water everyday. He drinks a total of 33 glasses of water in 11 days. How many glasses of water does he drink in total in June?

5 It costs Bran a total of 12 dollars to buy a pen, a ruler, and two pencils. Given that the price of a pen and a ruler is 6 dollars and 3 dollars, respectively, what is the price of a pencil?

6 Ryan is given 140 dollars to buy two pairs of tennis rackets and some tennis balls. The price of each racket is 49 dollars and that of each tennis ball is 1.5 dollars. How many tennis balls can he buy?

7 Sara can make 300 ml of lemonade with 6 spoonfuls of sugar. How much sugar does Sara need to make 1000 ml of lemonade?

8 Simons takes the same number of pills everyday. He takes a total of 21 pills in a week. How many pills does he take in 15 days?

9 Uncle Roger can make 200 g fried rice with 2 g green onions. How much green onions does uncle roger need to make 500 g fried rice?

10 Justin is working in a restaurant. He needs to distribute 12 fortune cookies to 6 customers. How many fortune cookie(s) are needed if there are 10 customers?

11 Potter has 50 dollars in his pocket. He plans to spend 12 dollars on breakfast and 20 dollars on lunch. How much can Potter spend on dinner?

12 Bobby's mother gives him 15 dollars and asks him to buy a bottle of ketchup at a price of 3 dollars. For the rest of the money, his mother tells him that he can buy whatever he wants. And Bobby wants some chololate for dessert. Each pieces of chocolate costs 1.2 dollars. How many pieces of chocolate can he buy with the rest of the money?

13 James is selling apples and bananas in a farmers' market. He has 87 fruits in total, and the number of apples is 17 less than the number of bananas. Suppose the number of apples is x. We can then write the number of bananas as _____ . Using this equation, we can get that there are _____ apples and _____ bananas.

14 The price for renting a moving truck is 5 dollars per hour for the first 4 hours, with additional hours charged at a rate of 2 dollars. There is also a one-time service fee of 10 dollars. A moving truck can be rented for _____ hours with 36 dollars.

15 The rate of an hourly hotel room is 10 dollars per hour for the first 3 hours, with additional hours charged at a rate of 8 dollars per hour. There is a one-time service fee of 15 dollars. If James' bill for an hourly room is 77 dollars, he can rent the room for _____ hours.

16 The price of renting a car is 60 dollars per day for the first 2 days, with additional days charged at a rate of 50 dollars per day. There is also a one-time service fee of 30 dollars. A car can be rented for _____ days with 500 dollars.

17 Elena is driving at a constant speed of 40 miles per hour. How many miles can she drive in 15 minutes?

18 The price of a glass of lemonade was 60 cents. Alice bought some glasses of lemonade with 12 dollars. How many glasses of lemonade did she buy?

19 The ratio of the prices of apple, orange and banana is $5 : 8 : 3$. Given that a kilogram of banana is 1.6 dollars cheaper than that of a kilogram of apple, a kilogram of apple costs _____ dollars. A kilogram of orange costs _____ dollars and a kilogram of banana costs _____ dollars.

20 Bran is walking at a constant speed of 50 meters per minute. How many meters can he walk in 12 seconds?

21 On average, Amy can read 15 pages of a 180-page fairy tale book each day. How many days does it take her to finish reading the book?

22 Dennis is driving a car on a highway at a constant speed of 60 miles per hour. How many miles can he drive the car for 10 minutes?

23 Star can decorate 8 cupcakes per hour, and she wants to decorate 60 cupcakes for a party. How many minutes will it take her to prepare all the cupcakes?

24 There are three trees, A, B, and C. The ratio of their heights is $2 : 3 : 5$. Given that C is 30 ft higher than A, the height of A is _____ ft. The height of B is _____ ft. The height of C is _____ ft.

25 There are three sticks, A, B, and C. The ratio of their lengths is $3:4:5$. Given that C is 20 cm longer than A, the length of A is _____ cm. The length of B is _____ cm and the length of C is _____ cm.

NOTE

Advanced Math

Complex Operation & Equation

Mixed Operation

1 Calculate:

(1) $-9 + 38 - 24 + 20 =$ _____

(2) $(-27) + 31 - (-33) + (-39) =$ _____

(3) $-7.25 + \left(-\frac{1}{4}\right) + 2.25 - (-1.25) =$ _____

(4) $-1\frac{1}{7} + (-7) + |-3 - 3| + \left(0 - 3\frac{6}{7}\right) =$ _____

2 $|11 - 9 - 27 - (-14)| =$ _____

$| - 9 \times 9 + 4 \times 5 - 11| =$ _____

$| - 63 \div 7 \times 3 + 60 \div 4| =$ _____

3 $13 \times (-4) - 12 \times (4 - 7) =$ _____

$32 \div 8 + (37 - 45) - 16 =$ _____

4 $|14.4 \div (-36) - 4| + 3 \times (-\frac{14}{5}) =$ _____

$| - 2| \times 1.25 + (-\frac{7}{8}) =$ _____

5 $2^{-5} \times 4^{3} =$ _____ .

$\frac{5^{10}}{5^{7}} =$ _____ .

$(\frac{3^{2}}{4})^{2} =$ _____ .

$(\frac{7}{5})^{-2} =$ _____ .

6 $(24 + 4^2) \times 5 - 3024 \div (4^3 + 8) =$ _____

$55 + 150 \div (2^4 - 1097^0) + (40^{40} \times 0 - 47) =$ _____

7 $(-2.025 \times 5 - |-\frac{9}{8}|) \times 4 =$ _____

$|-4 \times (-5.25)| \div |(-4)^2 - 9| =$ _____

8 $|12 \times (-1.5) - 23 - (-51)| =$ _____

$|11 \times 12 - 8 \times 12 - 13| =$ _____

$| - 96 \div 6 \times 4 + 14 \times 4| =$ _____

9 $|10 \times (7 - 13)| \div (-3) \times (-1.5) =$ _____

$1.75 \div (-7) \times 8 - (-\frac{9}{4}) =$ _____

10 $|10 + 7 - 20 - (-15)| =$ _____

$| - 4 \times 5 + 3 \times 7 - 9| =$ _____

$| - 42 \div 7 \times 5 + 72 \div 12| =$ _____

11 $-5.2 \times 5 - |-\frac{6}{5}| + (-0.8) =$ _____

$|-4 \times (-5.25)| + |(-3)^2 - 10| =$ _____

12 Calculate:

(1) $\left|-4\frac{3}{5}\right| + (-2.4) + |-(3.4)| + \left|-3\frac{2}{5}\right| =$ _____

(2) $\left|0 - \frac{1}{2}\right| + \left|\frac{1}{2} - \frac{2}{3}\right| + \left|\frac{2}{3} - \frac{3}{4}\right| + \cdots + \left|\frac{48}{49} - \frac{49}{50}\right| =$ _____

13 Calculate:

(1) $\left|-1\frac{67}{99}\right| + (-11.01) - |-8.99| + \left|-1\frac{32}{99}\right| =$ _____

(2) $\left|\frac{99}{100} - \frac{100}{101}\right| + \left|\frac{100}{101} - \frac{101}{102}\right| + \left|\frac{101}{102} - \frac{102}{103}\right| + \cdots + \left|\frac{998}{999} - \frac{999}{1000}\right| =$ _____

Exponents

1 $\frac{4^5}{16^2} =$ _____ .

$\frac{(-3)^5}{3^3} =$ _____ .

$\frac{(-2)^{10}}{2^{13}} =$ _____ .

$\frac{-999^{-4}}{999^{-3}} =$ _____ .

2 Calculate:

$\frac{9^8}{9^6} =$ _____ .

$\frac{11^2}{11^4} =$ _____ .

$\frac{(-2)^{13}}{2^{14}} =$ _____ .

$\frac{-1^{100}}{(-3)^2} =$ _____ .

3 $\frac{3^4}{9^3} =$ _____ .

$\frac{-2^3}{4^2} =$ _____ .

$\frac{(-2)^{99}}{2^{100}} =$ _____ .

$\frac{-5^4}{25^2} =$ _____ .

4 $\frac{3^8}{3^5} =$ _____ .

$\frac{4^2}{4^4} =$ _____ .

$\frac{(-1)^{13}}{(-1)^{26}} =$ _____ .

$\frac{-1^{13}}{(-1)^{10}} =$ _____ .

5 $\dfrac{3^5}{9^2} =$ _____ .

$\dfrac{(-2)^4}{4^3} =$ _____ .

$\dfrac{(-2)^{13}}{2^{14}} =$ _____ .

$\dfrac{-5^4}{5^3} =$ _____ .

6 $\dfrac{12^{-3}}{12^{-4}} =$ _____ .

$\dfrac{3^2}{3^{-1}} =$ _____ .

$\dfrac{(-3)^{-3}}{(-3)^{-5}} =$ _____ .

$\dfrac{-3^{-1}}{(-3)^{-2}} =$ _____ .

Recurring Decimals

1 Convert $0.\overline{51}$ to a fraction:

$100 \times 0.\overline{51}$ = _____ .

$33 \times 0.\overline{51}$ = _____ .

$0.\overline{51}$ = _____ .

2 Convert $0.\overline{78}$ to a fraction:

$100 \times 0.\overline{78}$ = _____ .

$99 \times 0.\overline{78}$ = _____ .

$0.\overline{78}$ = _____ .

3 Convert $0.\overline{51}$ to a fraction and calculate:

$0.\overline{51}$ = _____ .

$99 \times 0.\overline{51}$ = _____ .

$100 \times 0.\overline{51}$ = _____ .

4 Convert $0.1\overline{4}$ to a fraction and calculate:

$0.1\overline{4}$ = _____ .

$90 \times 0.1\overline{4}$ = _____ .

$18 \times 0.1\overline{4}$ = _____ .

5 Convert $0.\overline{69}$ to a fraction:

$100 \times 0.\overline{69}$ = _____ .

$99 \times 0.\overline{69}$ = _____ .

$0.\overline{69}$ = _____ .

6 Convert $0.\overline{27}$ to a fraction:

$100 \times 0.\overline{27}$ = _____ .

$99 \times 0.\overline{27}$ = _____ .

$0.\overline{27}$ = _____ .

7 Order the following numbers from least to greatest: 0.321, $0.3\overline{21}$, $0.32\overline{1}$, $\frac{9}{28}$, $\frac{40}{125}$.

A. $0.321 < \frac{9}{28} < 0.32\overline{1} < 0.3\overline{21} < \frac{40}{125}$

B. $0.3\overline{21} < \frac{9}{28} < 0.321 < \frac{40}{125} < 0.32\overline{1}$

C. $\frac{40}{125} < 0.321 < \frac{9}{28} < 0.3\overline{21} < 0.32\overline{1}$

D. $\frac{40}{125} < 0.321 < 0.32\overline{1} < 0.3\overline{21} < \frac{9}{28}$

8 Order these numbers from least to greatest.

0.64, $\frac{7}{11}$, $0.\overline{64}$, $0.6\overline{4}$

9 Order the following numbers from least to greatest: 0.475, $0.4\overline{75}$, $0.47\overline{5}$, $\frac{119}{250}$, $\frac{39}{80}$.

A. $0.475 < \frac{39}{80} < 0.47\overline{5} < 0.4\overline{75} < \frac{119}{250}$

B. $0.4\overline{75} < \frac{39}{80} < 0.475 < \frac{119}{250} < 0.47\overline{5}$

C. $\frac{119}{250} < 0.475 < \frac{39}{80} < 0.4\overline{75} < 0.47\overline{5}$

D. $0.475 < 0.47\overline{5} < 0.4\overline{75} < \frac{119}{250} < \frac{39}{80}$

10 Convert the following recurring decimals into fractions:

(1) $0.\overline{45} =$ _____

(2) $3.\overline{639} =$ _____

(3) $0.\overline{288} =$ _____

11 Convert the following recurring decimals into fractions:

(1) $0.\overline{81}$ = _____

(2) $8.\overline{63}$ = _____

(3) $0.\overline{592}$ = _____

Complex Equation

1 Solve the equation

$(x - 4) \div 75 = 2$

2 Solve the equation

$4(x - 3) + 6x = 28$

3 Solve the equation

$4(x + 5) \div 3 - 6 = 10$

4 Solve the equation

$25(x + 4) \div 5 = 24$

5 Solve the equation

$15\ (x - 4) = 12x$

6 Solve the equation

$3(x + 1) - 2(x + 2) = 10$

7 Solve the equation

$3(x + 2) = 5x - 4$

8 Solve the equation

$5(x + 3) \div 6 \times 3 = 20$

9 Solve the equation

$4 \times (x - 3) = 3 \times (2 + x)$

10 Solve the equation

$4(2x - 1) - 3x = 14$

11 Solve the equation

$(7x + 3) \div 4 = 13$

12 Solve the equation

$(x + 1) \times 4 = 80$

13 Solve the equation

$7\,(x + 5) \div 3 = 21$

14 Solve the equation

$-5 = 5x - 7(1 - x)$

15 Solve the equation

$3(x - 2) \div 5 + 6 = 15$

16 Solve the equation

$3(2x - 1) = 4(3 - x)$

17 Solve the equation

$7x + 4 \times (28 - x) = 222 + 2x$

18 Solve the equation

$4\,[2\,(9 - 5x) - 1] - 2\,[1 + 3\,(9 - 5x)] = 2$

19 Solve the equation

(1) $5x = (x - 50) \times 6$

(2) $3\,(4x - 2) - 2\,(3x + 3) = 9 - 8x$

20 Solve the equation

(1) $(36 + x) \times 4 \div 2 = 336$

(2) $6(5 - x) - 3(4x + 2) = 4(3x - 7) - 8$

21 Solve the equation

(1) $2(x - 1) + 3x = 18$

(2) $18(x + 15) - 5x = 660$

22 Solve the equation

(1) $6\,(4x + 12) = 120$

(2) $3x = 2\,(36 + x) + 30$

23 Solve the equation

(1) $12x - 4(x - 2) = 28$

(2) $12x - 2(5 + x) = 20$

24 Solve the equation

(1) $(3x - 4) \div 8 = 7$

(2) $6(x + 8) = 54$

25 Solve the equation

(1) $(x + 17) \div 3 = 14$

(2) $4(y + 1) = 6(y - 1)$

26 Solve the equation

(1) $5(x+3) = 3(x+5)$

(2) $3(15-2x)+12 = 85-10x$

27 Solve the equation

(1) $6(x-5) = 126$

(2) $(8-2x)\times 31 = 124$

28 Solve the equation

(1) $(3x + 16) \div 7 + (2x + 7) \div 3 = 2x + 1$

(2) $5x - 2(2x - 1) = 8$

29 Solve the equation

(1) $25(x + 4) = 100$

(2) $(16 - 2x) \div 3 = 4$

(3) $30 - 2(5 - x) = 4x$

30 Solve the equation

(1) $56x = 42(x + 2)$

(2) $3(2x - 1) = 4(3 - x)$

(3) $(x - 8 + 10) \div 2 = 1$

31 Solve the equation

(1) $10x + 3(x + 1) = 5x + 14$

(2) $14x - (5x + 7) = 7x$

(3) $(3x + 16) \div 7 + (2x + 7) \div 3 = 2x + 1$

32 Solve the equation

(1) $7x + 2 \times 10 = 55$

(2) $(28 + x) \times 2 = 104$

(3) $(x + 1) \div 8 = 24$

33 $4(x + 17) = 76$, $x =$ _____ .

$-11(-25 - x) = 55$, $x =$ _____ .

34 $4(x+4)=64$, $x=$ _____ .

$-5(x-2)=25$, $x=$ _____ .

35 $\frac{1}{7}(x-\frac{7}{6})=\frac{1}{12}$, $x=$ _____ .

$-3(x-\frac{3}{2})=5$, $x=$ _____ .

36 $-18(x-\frac{3}{2}) = 27(\frac{4}{3}-x), x =$ _____ .

$\frac{15}{4}(\frac{4}{5}x-\frac{7}{20}) = -\frac{3}{2}(\frac{1}{4}-4x), x =$ _____ .

37 $0.2(3x+2) = 4-1.2x,\ x =$ _____ .

$-2.5(x-3) = 3+0.5x,\ x =$ _____ .

38 $1.5(11x + 2) = 12.5 - 2.5x$, $x =$ _____ .

$-1.2(x - 5) = -4.8 + 2.4x$, $x =$ _____ .

39 $-14 + 15(x - 2) = -2x + 7$, $x =$ _____ .

$-3x + (8x - 9) = 8 - (3x - 7)$, $x =$ _____ .

40 $3(x - \frac{1}{6}) = -8(\frac{1}{4} - x), x =$ _____ .

$5(\frac{1}{2}x - 4) = -6(\frac{1}{3} - 2x), x =$ _____ .

41 $4 - 3(x + 2) = 2x + 8,\ x =$ _____ .

$3x + (6x - 10) = 3 - (x - 7),\ x =$ _____ .

42 $-18(x-\frac{3}{2})=27(\frac{4}{3}-x), x=$ _____ .

$\frac{15}{4}(\frac{4}{5}x-\frac{7}{20})=-\frac{3}{2}(\frac{1}{4}-4x), x=$ _____ .

43 $1.9(-10x+5)=1.5+x, x=$ _____ .

$1.4(4x-13)-5=-2.4x-22, x=$ _____ .

44 $2.3(4x + 5) - 12.2 = 4.9 - 10.8x$, $x =$ _____ .

$14 + 1.7(9x + 10) = 7.3x + 38$, $x =$ _____ .

45 $0.55(4x + 14) = 12 - 2.8x$, $x =$ _____ .

$1.7(4x + 17) = -1.2x + 32.3$, $x =$ _____ .

46 $\frac{7}{9}(x-\frac{1}{7})=1, x=$ _____ .

$-\frac{5}{7}(x-1)=\frac{15}{14}, x=$ _____ .

47 $2(x+\frac{5}{12})=\frac{1}{3}x, x=$ _____ .

$-\frac{5}{4}(x-1)=\frac{7}{12}-\frac{2}{3}x, x=$ _____ .

48 $-4x - \frac{2}{3} = -\frac{19}{4}(x + \frac{2}{19}), x =$ _____ .

$\frac{2}{3}(-\frac{3}{4}x + 1) = \frac{5}{4}, x =$ _____ .

49 $\frac{1}{2}(x - \frac{1}{3}) + \frac{7}{4} = \frac{5}{12}, x =$ _____ .

$\frac{1}{2}x - \frac{1}{3}(x + \frac{2}{3}) = \frac{1}{6}, x =$ _____ .

50 $1.6(4x + 10) = 13 - 1.6x$, $x =$ _____ .

$1.7(3x + 20) - 3 = 4.9x - 13$, $x =$ _____ .

51 $1.25(16x + 4) - 1 = 13 + 2x$, $x =$ _____ .

$9 + 0.44(10x - 15) = -3.6x - 4$, $x =$ _____ .

52 $5.25(12x - 12) = 3 + 8x$, $x =$ _____ .

$3.375(16x + 4) = -x - 8.5$, $x =$ _____ .

53 $\frac{2}{3}(x + \frac{3}{2}) - \frac{1}{4} = \frac{13}{6}$, $x =$ _____ .

$\frac{1}{12}x - \frac{3}{2}(x + \frac{3}{2}) = -\frac{11}{12}$, $x =$ _____ .

54 $\frac{1}{8}(5x-\frac{1}{8})=1, x=$ _____ .

$-\frac{5}{2}(3x-1)=\frac{25}{8}, x=$ _____ .

55 $4(x+\frac{1}{2})=\frac{16}{9}x, x=$ _____ .

$-\frac{7}{4}(2x-1)=\frac{7}{2}+\frac{3}{4}x, x=$ _____ .

56 $\frac{5}{4}x - \frac{1}{12} = \frac{17}{12}(x + \frac{16}{17}), x =$ _____ .

$\frac{1}{3}(-\frac{9}{4}x + 1) = \frac{3}{8}, x =$ _____ .

57 $1.5(8x + 10) = 4 + x, x =$ _____ .

$1.375(4x + 8) - 3 = 3.5x - 22, x =$ _____ .

58 $1.75(12x + 2) - 1 = 7 - 1.5x$, $x =$ _____ .

$-9 + 0.46(10x + 4) = 4.4x - 2$, $x =$ _____ .

59 $0.125(16x + 12) = -2 + 2.5x$, $x =$ _____ .

$7.75(6x + 8) = 4.5x - 32.5$, $x =$ _____ .

60 $\frac{1}{4}(x-\frac{1}{2})-\frac{3}{4}=\frac{5}{8}$, $x=$ _____ .

$\frac{5}{6}x-\frac{2}{3}(x+\frac{3}{2})=2\frac{1}{2}$, $x=$ _____ .

61 $\frac{1}{3}(x-\frac{1}{3})=1$, $x=$ _____ .

$-\frac{5}{4}(x-1)=\frac{15}{4}$, $x=$ _____ .

62 $3(x+\frac{5}{6})=\frac{1}{6}x, x=$ _____ .

$-\frac{3}{2}(x-1)=\frac{7}{4}+\frac{1}{4}x, x=$ _____ .

63 $2x-\frac{1}{3}=\frac{3}{2}x, x=$ _____ .

$-\frac{8}{3}(\frac{1}{2}x-2)=\frac{56}{3}, x=$ _____ .

64 $5x - \frac{1}{3} = \frac{17}{3}(x + \frac{4}{17}), x =$ _____ .

$\frac{8}{3}(-\frac{3}{2}x + 1) = \frac{11}{4}, x =$ _____ .

Equation with Multiple Unknown Numbers

1 Solve the equation: $|x + y + 6| + (x - y)^2 = 0$, $x + 3y =$ _____ .

2 Solve the equation: $|x-2y+3|+(x+y)^2=0$, $2x+3y=$ _____ .

3 Solve the equation

$$\begin{cases} a-1=b+1 \\ a+1=3(b-1) \end{cases}$$

4 Solve the equation

(1) $\begin{cases} y=2x \\ 3x+y=20 \end{cases}$

(2) $\begin{cases} x+y=10 \\ x-y=2 \end{cases}$

5 Solve the equation

(1) $\begin{cases} 2x - y = 7 \\ 2x + y = 17 \end{cases}$

(2) $\begin{cases} x + 2y = 10 \\ x + 3y = 12 \end{cases}$

6 Solve the equation

(1) $\begin{cases} 3x - 15y = 0 \\ 3x + 2y = 17 \end{cases}$

(2) $\begin{cases} 2x + 5y = 17 \\ 2x - 3y = 9 \end{cases}$

7 Solve the equation

(1) $\begin{cases} y - 2x = 2 \\ 3x - y = 1 \end{cases}$

(2) $\begin{cases} y + 3 = 2x \\ 3x + y = 12 \end{cases}$

8 Solve the equation

(1) $\begin{cases} x + y = 100 \\ x - y = 24 \end{cases}$

(2) $\begin{cases} x + 2y = 10 \\ x - 2y = 2 \end{cases}$

9 Solve the equation

(1) $\begin{cases} 9x + 11y = 100 \\ 7x + 11y = 90 \end{cases}$

(2) $\begin{cases} 19x - 5y = 301 \\ 11x - 5y = 149 \end{cases}$

10 Solve the equation

(1) $\begin{cases} x = y - 50 \\ x + y = 190 \end{cases}$

(2) $\begin{cases} x + 3y = 7 \\ y - x = 1 \end{cases}$

11 Solve the equation

(1) $\begin{cases} x + y = 17 \\ 2x - y = 10 \end{cases}$

(2) $\begin{cases} 5x + 3y = 13 \\ 2x - 3y = 1 \end{cases}$

12 Solve the equation

(1) $\begin{cases} x + 3y = 7 \\ 7x - 3y = 1 \end{cases}$

(2) $\begin{cases} 3x + 2y = 28 \\ 8x - 2y = 38 \end{cases}$

13 Solve the equation

(1) $\begin{cases} x = 2y \\ x + 3y = 15 \end{cases}$

(2) $\begin{cases} y = x + 7 \\ x + y = 27 \end{cases}$

14 Solve the equation

(1) $\begin{cases} 3x + 5y = 21 \\ 3x + 6y = 24 \end{cases}$

(2) $\begin{cases} 2x - y = 12 \\ x - y = 2 \end{cases}$

15 Solve the equation

(1) $\begin{cases} x + y = 9 \\ x - y = 1 \end{cases}$

(2) $\begin{cases} x + 2y = 9 \\ 2y - x = 7 \end{cases}$

16 Solve the equation

(1) $\begin{cases} 4x + 2y = 12 \\ 3x - 2y = 2 \end{cases}$

(2) $\begin{cases} 4x + 2y = 12 \\ 4x - 3y = 2 \end{cases}$

17 Solve the equation

(1) $\begin{cases} 2x + y = 13 \\ 4x - 3y = 11 \end{cases}$

(2) $\begin{cases} 3x - 2y = 30 \\ 5x - 4y = 48 \end{cases}$

18 Solve the equation

(1) $\begin{cases} x - y = 5 \\ x + y = 13 \end{cases}$

(2) $\begin{cases} 3x - 4y = 5 \\ 3x + 4y = 13 \end{cases}$

(3) $\begin{cases} 3x + 2y = 18 \\ 5x + 2y = 26 \end{cases}$

19 Solve the equation

(1) $\begin{cases} 5x + 7y = 52 \\ 5x + 2y = 22 \end{cases}$

(2) $\begin{cases} 7x + 5y = 41 \\ 8x + 5y = 44 \end{cases}$

20 Solve the equation

(1) $\begin{cases} x + y = 10 \\ x - y = 2 \end{cases}$

(2) $\begin{cases} 3x + 2y = 15 \\ 3x - 2y = 3 \end{cases}$

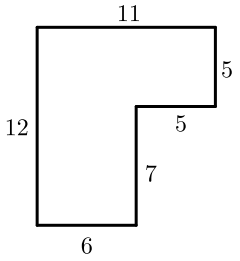
(3) $\begin{cases} x = 2y \\ x + y = 9 \end{cases}$

NOTE

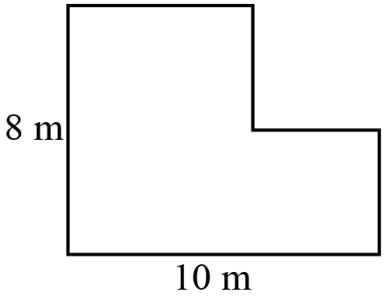
Geometry

Trick to Find Perimeter

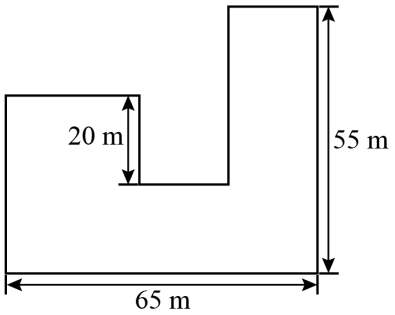
1 Find the perimeter and the area of the irregular figure below. (Unit: centimeters)



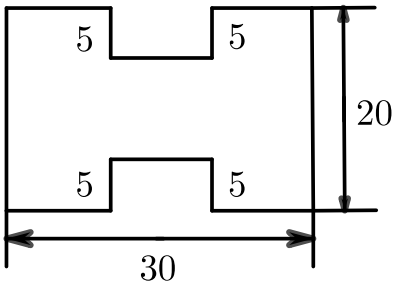
2 What is the perimeter of the figure below?



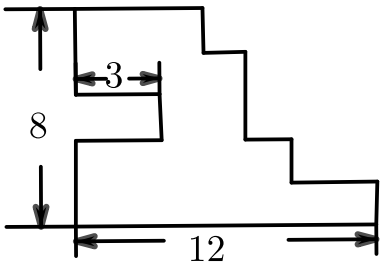
3 Find the perimeter of the irregular figure below.



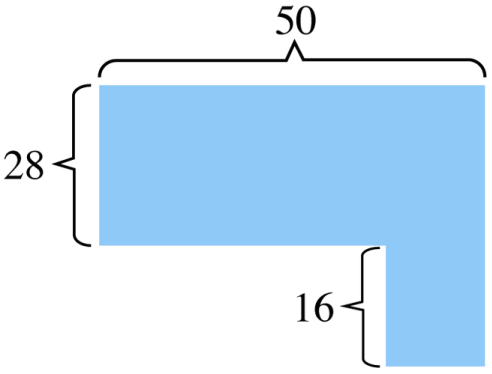
4 Find the perimeter of the figure below. (Unit: cm)



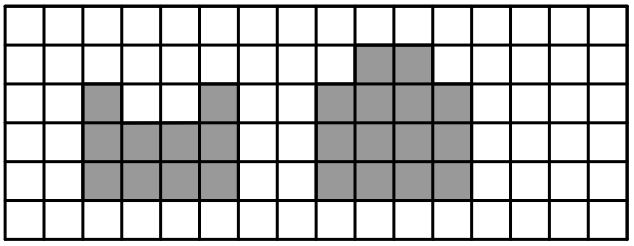
5 Find the perimeter of the figure below. (Unit: cm)



6 Given the lengths of 3 sides of the figure below, the perimeter of the figure is _____ cm. (Unit: cm)

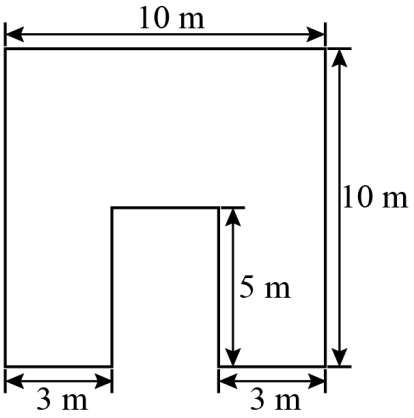


7 As shown in the figure below, compare the perimeters and areas of the two shaded shapes, respectively. Which one is correct?

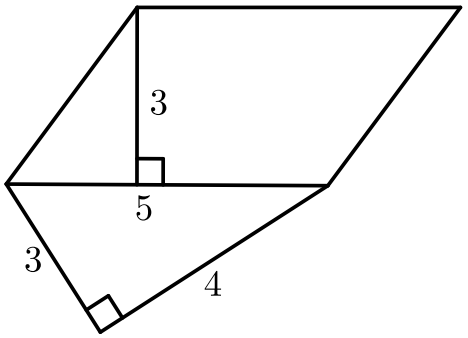


A. Areas are equal, and perimeters are equal.
B. Areas are equal, and perimeters are NOT equal.
C. Areas are NOT equal, and perimeters are equal.
D. Areas are NOT equal, and perimeters are NOT equal.

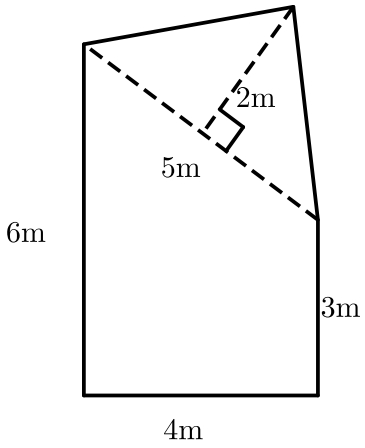
8 Find the perimeter and the area of the irregular figure below.



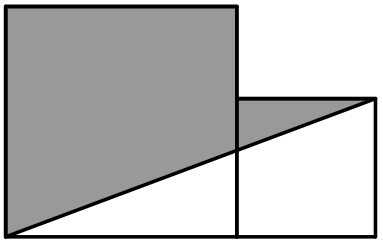
9 The figure below consists of a right triangle and a parallelogram. The area of the whole figure is _____ .



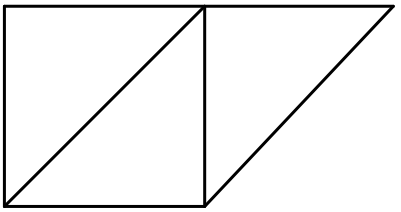
10 The figure below consists of a triangle and a right trapezoid. The area of the whole figure is _____ m^2.



11 As shown below, the side length of the large square is 9 cm, and that of the small square is 5 cm. The area of the shaded part is _____ cm^2.

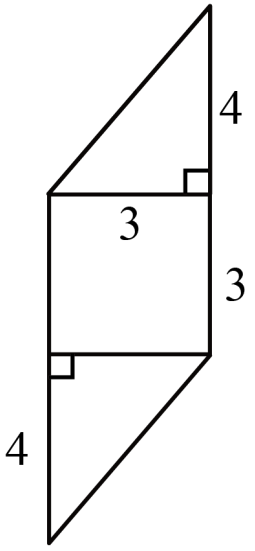


12 The perimeter of the square in the picture is 36 cm, so what is the area of the parallelogram below?

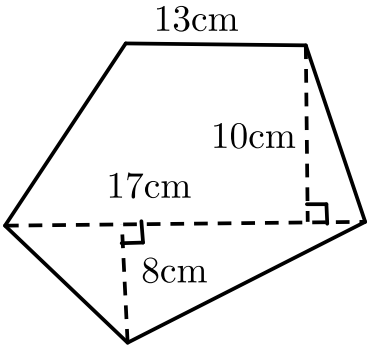


13 Expanding the base of a parallelogram by 3 times without changing its height, the area will become _____ times larger than before.

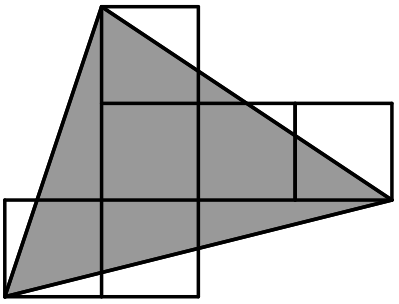
14 The area of the figure below is _____ .



15 Calculate the area of the figure below.



16 The side length of each small square is 2, so the area of the shaded triangle is _____ .



NOTE

NOTE

Word Problems

Complex Word Problems

1. A photocopier can finish copying a document at speed of 50 pages per minute. Speed up the rate of the photocopier by 20 more pages per minute, he will finish the job in 2 minutes less. How many pages are there in the document?

2. A teacher is marking the papers of the whole class. She plans to finish the work in 5 hours. After working for one hour, she finds that if she wants to finish the work as planned, she needs to mark 6 more papers per hour. But if she can mark 10 more papers per hour, she can even finish marking all the papers 1 hour earlier. How many papers does she need to mark in total?

3 A long distance calling plan charges 80 cents for any call up to 15 minutes long and 5 cents for each additional minute. If it takes Ryan a total of 1.4 dollars, how many minutes does the call last?

4 A company supplies electricity to residents. Each month's bill is computed as follows:
All customers pay a monthly customer fee of 1.8 dollars, plus a fee of 0.15 dollars per kilowatt hour (kWhr) for the first 300 kWhr supplied in the month, plus a fee of 0.20 dollars per kWhr for all usage over 300 kWhr. Given that Sophia's monthly bill is 62.8 dollars, find her electricity usage for the month.

5 Cindy is going to a state fair. The admission fee for the state fair is 5 dollars, and the ride ticket is sold for 2 dollars each. How many rides can Cindy take if she only has 20 dollars?

6 A car rental company offers a car for 24 dollars per day plus 30 cents per mile for miles up to 200 miles and 25 cents per mile for miles over 200 miles. Arthur rents a car for a day. The bill for his renting is 104 dollars. How many miles does he drive the car for?

7 Kate is ordering cupcakes online for the party tonight. The Bakery prices cupcakes according to the number of cupcakes ordered. For orders of 20 or fewer cupcakes, the price is 4.50 dollars per cupcake plus 12 dollars shipping and handling on the order. For orders of more than 20 cupcakes, the additional cupcakes over 20 will recieve a 20% discount. Given that Kate's bill is 120 dollars, how many cupcakes does she order?

8 Tim is Tom's older brother. Tim's age is three times that of Tom. 24 years later, Tim's age will be 16 less than twice that of Tom. Tim is _____ years old and Tom is _____ years old.

9 Mr. White spent 105 dollars on a total of 8 books, and the books are either novels or comic books. The price of a novel is 15 dollars and the price of a comic book is 12 dollars. How many comic books did he buy?

10 Teresa is riding a bike from A to B. She decides to arrive at B in 12 hours. After riding for one hour, Teresa finds that if she wants to arrive in time as decided, she needs to ride 4 more kilometers per hour; but if she can ride 8 more kilometers per hour, she can even arrive at B 2 hours earlier. What is the distance between A and B?

11 Diana is producing a batch of scarfs. She plans to finish the task in 6 days. But if she can produce 24 more scarfs per day, she can finish the job 2 days earlier. How many scarfs does she need to produce?

12 It usually takes Charles 15 minutes to walk to school. Today, he walks 15 more meters per minute than usual and it takes him 3 minutes less. What is the distance from his home to school?

13 In the college parking lot, each employer is allotted 40 free hours of parking per week. After that, they pay 5 dollars per hour up to 50 hours, 8 dollars per hour from 50 hours to 60 hours, and 15 dollars for each hour after that. An employer received a parking bill of 82 dollars for the week. How many hours did he park his car in the parking lot?

14 Students in the reading club are divided into several discussion groups. Each group has either 8 students or 4 students. All together there are 72 students and 14 groups. How many groups are there having 8 students?

15 Anna can finish reading a book in 15 days. If she wants to finish reading the book 3 days earlier, she needs to read 12 more pages on average each day. How many pages does the book have?

16 Roy is paid 1.4 times his normal hourly rate for each hour he works over 30 hours in a week. His normal hourly rate is 11.8 dollars. Given that he earned 436.6 dollars last week, how many hours did he work?

17 Laura is fencing a rectangular field. She plans to finish the task in 6 hours. But if she can fence 4.5 more meters per hour than expected, she can fininsh it 1.5 hours earlier. What is the perimeter of the rectangular field?

18 There is a total of fifty six-wheel trucks and eight-wheel trucks in the parking lot. Grace counts and finds out there are 340 wheels in total. How many six-wheel trucks and eight-wheel trucks are there, respectively?

19 Jennifer and Amy went shopping. Jennifer had 4 dollars more than twice as much money as Amy had. After Jennifer spent 3 dollars and Amy spent 10 dollars, the amount of money that Jennifer had was 1 dollar more than four times that Amy had. Originally, Jennifer had _____ dollars and Amy had _____ dollars.

20 Joe is mowing a lawn. He plans to finish the job in 8 hours. But with a new mower, he can mow 45 feet^2 of lawns in an hour more than planned. Given that he finishs the job 3 hours earlier than planned, find the area of the lawn.

21 Rose wants to buy some fruit with a certian amount of money. If she spends all the money buying oranges, she can buy 3 kilograms. If she spends all the money buying bananas which is 1.5 dollars per kilogram cheaper than oranges, she can buy 1.8 kilograms more. How much money does she has?

22 A certain country taxes the first 20000 dollars of an individual's annual income at a rate of 15%, and all income over 20000 dollars is taxed at 20%. If an individual is taxed 7000 dollars, how much is her/his income?

23 An television salesperson receives a base salary of 2500 dollars per month plus a commission. The commission is 2% of the sales up to and including 25000 dollars for the month and 5% of the sales over 25000 dollars for the month. A salesperson's salary for July is 3300 dollars. How much is his/her sale for July?

24 Dani went to a stationery store to buy pens and pencils. A pen is 5 dollars and a pencil is 2 dollars. Dani spent 120 dollars for 30 pens and pencils, then she bought _____ pens and _____ pencils.

25 It takes a boat 11 hours to travel downstream from Port A to Port B and 15 hours to travel upstream from Port B to Port A. The speed of the current is 5 km/h. Assume the speed of the boat in still water and the speed of the current are unchanged. Find the distance between Port A and Port B.

26 A car rental company charges a flat fee of 30 dollars to rent a car. In addition to that you have to pay a daily fee. If you keep the car for 5 days or less, it costs 25 dollars per day. If you keep the car longer than 5 days, it costs 20 dollars for each additional day. Given that Steven paid 275 dollars for renting a car, how long could he keep the car?
(Hint: If a car is rented for 6 days, the bill you need to pay is $30 + 5 \times 25 + (6 - 5) \times 20 = 175$ dollars.)

27 Sophia is walking from her home to the school. She decides to arrive at the school in 20 minutes. After walking for 5 minutes, Sophia finds that if she wants to arrive at school in time as decided, she needs to walk 5 more meters per minute; but if she can walk 18 more meters per minute. she can even arrive at the school 3 minutes earlier. What is the distance between her home and the school?

28 Some chicken and rabbits are in one cage. Alice counts and finds out there are 72 feet and the number of chicken and rabbits are the same. There are _____ rabbits in this cage.

A. 10 B. 11 C. 12 D. 13

29 Laura is producing a batch of gloves. She plans to finish the task in 8 hours. But if she can produce 4 more pairs of gloves per hour, she can finish it 2 hours earlier. How many pairs of gloves does she need to produce?

30 An laptop salesman receives a base salary of 1800 dollars per month plus a commission. The commission is 2.5% of the sales up to and including 20000 for the month and 4% of the sales over 20000 dollars for the month. If a salesman's monthly salary is 2620 dollars, how much is his sales?

31 Lisa has some pocket money and she wants to buy something to drink. She can buy 10 glasses of orange juice with that money. But if she buys lemonade which is 0.8 dollars cheaper per glass, she can buy 4 more glasses. How much money does she have?

32 A small pipe can pump 200 gallons of water per hour. A large pipe can pump 120 more gallons of waters in an hour than a small one does. In order to fill in a tank with water, it takes 1.5 more hours to use a small pipe than to use a large pipe. What is the volume of the tank?

33 A car rental company charges a service fee of 55 dollars to rent a car. In addition to that you have to pay a daily fee. If you keep the car for 7 days or less, it costs 35 dollars per day. If you keep the car longer than 7 days, it costs 30 dollars for each additional day. Given that Elena paid 480 dollars for renting a car, how long could she keep the car?

34 An car salesperson receives a base salary of 2450 dollars per month plus a commission. The commission is 0.5% of the sales up to and including 240000 for the month and 0.7% of the sales over 240000 dollars for the month. A salesperson the salary for a certain month is 4490 dollars. How much is his sales for the month?

35 A taxi charges 2.5 dollars for any drive up to 1.8 km long and 1.2 dollars for each additional kilometer. If it costs Ryan a total of 8.5 dollars for a taxi drive, how long is the taxi drive?

36 A store sells umbrella. On sunny days the store can sell 15 umbrellas a day. On rainy days the store can sell 20 umbrellas a day. Last week, the store sold a total of 120 umbrellas. How many days of last week are sunny?

37 There are two kinds of bottles, A and B. Bottle A can hold 10 kilograms of water and bottle B can hold 20 kg of water. A total of 900 kilograms of water were filled in 50 bottles. There are _____ bottle A and _____ bottle B.

38 Lucy can finish reading a fairy tale book in 17 days. If she wants to finish reading the book 4 days earlier, she needs to read 8 more pages on average each day. How many pages does the book have?

39 Alan and Phillip start at the same time and walk from A to B. It takes Phillip 12 minutes to arrive at B. Phillip walks 15 meters more than Alan does per minute. Given that Phillip arrives at B 3 minutes earlier than Alan does, find the distance between A and B.

40 A cinema sold a total of 40 tickets for ticket A and B, which worth 1600 dollars in total. Given that the unit price of ticket A is 30 dollars and the unit price of ticket B is 50 dollars. How many tickets A and tickets B did the cinema sell, respectively?

41 Sam is producing an order of hats. He decides to finish the work in 8 hours. After working for one hour, Sam finds that if he wants to achieve the goal, he needs to make 8 more hats per hour; but if he can make 29 more hats per hour, he can even finish the work 3 hours earlier. How many hats does he need to make in total?

42 Peter is taking a math exam. There are three parts in the exam: multiple choices, 'fill in the blank', and short answers. The duration of the exam is 90 minutes, and Peter has already spent 23 minutes in the multiple choices questions and 35 minutes on the 'fill in the blank' questions. What is the possible time he can spend on the last section (short answers) if he wants to finish the exam on time?

43 A certain county has a tax code, where 10% tax rate is paid on all income up to the first 10000 dollars, a 15% tax rate is paid for any income over 10000 dollars and up to 25000 dollars, and a tax rate of 25% is paid on all income over 25000 dollars. Given that Mr. Smith was taxed 4500 dollars last month, find his annual income last month.

44 It takes Andrea 3 hours to drive from A to B. If he can drive 15 miles per hour faster, he can save half an hour. What is the distance between A and B?

45 The standards of the phone bills in city A are:

(1) The phone bill is 30 cents per minute within 3 minutes (including 3 minutes).

(2) When the call time exceeds 3 minutes, the excess part will be charged for $\$1.1$ per minute.

If James has $\$9.7$ in his account, how long can James make a phone call with his friends at most?

NOTE

Combinatorics

Number Theory

1 Find the prime factorizations of the following numbers.

(1) 48= _____ (2) 64= _____

2 Find the prime factorizations of the following numbers.

(1) 80= _____ (2) 58= _____

3 Find the prime factorizations of the following numbers.

(1) 36= _____ (2) 24= _____

(3) 91= _____

4 Find the prime factorizations of the following numbers.

(1) 18 = _____ (2) 48 = _____

(3) 75 = _____

5 Find the prime factorizations of the following numbers.

(1) 33= _____ (2) 60= _____

(3) 90= _____

6 Find the prime factorizations of the following numbers.

(1) 30= _____ (2) 56= _____

(3) 84= _____

7 Find the prime factorizations of the following numbers.

(1) 60 = _____ (2) 72 = _____

(3) 84 = _____

8 Find the prime factorizations of the following numbers.

(1) 12 = _____ (2) 45 = _____

(3) 75 = _____

9 Find the prime factorizations of the following numbers.

(1) 86= _____ (2) 72= _____

(3) 44= _____

10 Find the prime factorizations of the following numbers.

(1) 48= _____ (2) 119= _____

(3) 360= _____

11 Find the prime factorizations of the following numbers.

(1) 60= _____ (2) 76= _____

(3) 68= _____

12 Find the prime factorizations of the following numbers.

(1) 28= _____ (2) 87= _____

(3) 380= _____

13 Find the prime factorizations of the following numbers.

(1) 24= _____ (2) 72= _____

(3) 180= _____

14 Find the prime factorizations of the following numbers.

(1) 123 = _____ (2) 135 = _____

(3) 112 = _____

15 Find the prime factorizations of the following numbers.

(1) 24= _____ (2) 252= _____

(3) 231= _____

16 Find the prime factorizations of the following numbers.

(1) 525= _____ (2) 414= _____

(3) 264= _____

17 Find the prime factorizations of the following numbers.

(1) 20 = _____ (2) 51 = _____

(3) 40 = _____ (4) 27 = _____

18 Find the prime factorizations of the following numbers.

(1) $36 =$ _____ (2) $66 =$ _____

(3) $78 =$ _____ (4) $92 =$ _____

19 Find the prime factorizations of the following numbers.

(1) $16=$ _____ (2) $21=$ _____

(3) $35=$ _____ (4) $48=$ _____

20 Find the prime factorizations of the following numbers.

(1) $20 =$ _____ (2) $78 =$ _____

(3) $30 =$ _____ (4) $56 =$ _____

21 Find the prime factorizations of the following numbers.

(1) 44= _____ (2) 105= _____

(3) 64= _____ (4) 45= _____

22 Find the prime factorizations of the following numbers.

(1) 34= _____ (2) 18= _____

(3) 9= _____ (4) 56= _____

23 Find the prime factorizations of the following numbers.

(1) 40= _____ (2) 52= _____

(3) 90= _____ (4) 96= _____

24 Find the prime factorizations of the following numbers.

(1) 26= _____ (2) 70= _____

(3) 42= _____ (4) 56= _____

25 Find the prime factorizations of the following numbers.

(1) 81= _____ (2) 125= _____

(3) 165= _____ (4) 98= _____

26 Find the prime factorizations of the following numbers.

(1) 30= _____ (2) 45= _____

(3) 24= _____ (4) 40= _____

27 Find the prime factorizations of the following numbers.

(1) 65= _____ (2) 56= _____

(3) 87= _____ (4) 39= _____

28 Find the prime factorizations of the following numbers.

(1) 24= _____ (2) 36= _____

(3) 91= _____ (4) 75= _____

29 Find the prime factorizations of the following numbers.

(1) 28 = _____ (2) 33 = _____

(3) 26 = _____ (4) 45 = _____

30 Find the prime factorizations of the following numbers.

(1) 195 = _____ (2) 147 = _____

(3) 306 = _____ (4) 288 = _____

31 Find the prime factorizations of the following numbers.

(1) 146= _____ (2) 255= _____

(3) 360= _____ (4) 400= _____

32 Find the prime factorizations of the following numbers.

(1) 35= _____ (2) 72= _____

(3) 240= _____ (4) 715= _____ _____

33 Find the prime factorizations of the following numbers.

(1) 36 = _____ (2) 120 = _____

(3) 360 = _____ (4) 286 = _____

34 Find the prime factorizations of the following numbers.

(1) 228= _____ (2) 546= _____

(3) 294= _____ (4) 825= _____

35 The product of two prime numbers is 65. These two numbers are _____ and _____ .

36 The product of three consecutive even numbers is 480. The sum of these three numbers is _____ .

37 The product of three consecutive numbers is 39270. The sum of these three numbers is _____ .

38 The product of four consecutive numbers is 3024. The sum of these four numbers is _____ .

39 The product of three consecutive numbers is 120. These three natural numbers are _____ , _____ , and _____ , respectively.

40 The product of four consecutive numbers is 3024. The largest one of the four numbers is _____ .

41 The product of two natural numbers is 2020. The minimum sum of these two numbers is _____ .

42 The product of four consecutive numbers is 360. These four numbers are _____ , _____ , _____ , and _____ .

43 How many 0s are there by the end of the result of $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times \cdots \times 25$?

A. 4 B. 5 C. 6 D. 7

44 There are three natural numbers whose sum is equal to their product. These three numbers are _____ , _____ , and _____ .

Permutation and Combination

1. There are three balls, red, blue, and pink. Amy wants to take two of them. There are _____ ways for Amy to take the balls.

2. There are 4 different cups on the desk. Tina wants to take 3 of them. There are _____ ways for Tina to choose.

3. There are 4 pens, a black one, a brown one, a white one, and a pink one on the desk. John wants to take two of them. There are _____ ways for John to choose.

4 There are 3 different toys. In how many different ways can they form a line?

A. 5 B. 6 C. 7 D. 8

5 There is a purple pen, a red pen, a pink pen, a black pen, a brown pen, and a yellow pen in a pencilbox. Tina wants to take 2 of them at the same time. There are _____ ways for Tina to take the pens.

6 There is a magazine, a biography, a dictionary, a historical novel, a detective novel, and a romantic novel in a bookshelf. Bob wants to take 3 of them at the same time. There are _____ ways for Bob to take the books.

7 There is a magazine, a biography, a dictionary, a textbook, a historical novel, a romantic novel, and a detective novel in the bookshelf. Tom wants to take 4 of them at the same time. There are _____ ways for Tom to take the books.

8 There are 4 students, Bob, Amy, Black, and Lisa, lining up to take photos. In how many different ways can they form the line?

A. 21 B. 22 C. 23 D. 24

9 There is a purple pen, a red pen, a pink pen, a black pen, a brown pen, and a yellow pen in a pencilbox. Tina wants to take 3 of them at the same time. There are _____ ways for Tina to take the pens.

10 There are _____ different ways for a librarian to lend eight different books to four students, given that each student gets only one book.

A. 1200 B. 1440 C. 960 D. 1680

11 There are _____ different ways for a teacher to give 12 different fruits to 5 girls, given that each girl gets only one fruit.

A. 10040 B. 95040 C. 9600 D. 7240

12 There are _____ different ways to choose 4 students from a group of 6 to participate in the competition.

13 There are _____ different ways to choose 6 students from a group of 8 to go to library.

14 There are _____ different ways to choose three students from a group of 6 to join a party.

15 Eight students: Bob, Mogo, Mike, Tim, John, Yoyo, Cindy, and Ella take part in a long distance race. The fastest three students will be awarded different prizes. There are _____ results of getting prizes.

16 A dog toy, a cat toy, a rabbit toy, a monkey toy, a deer toy, and a sheep toy are sold in the store. Mike wants to take 2 of them at the same time. There are _____ different ways.

17 Five students want to take a photo together. Answer the questions.

(1) There are _____ ways for them to line up.

(2) Their teacher wants to take a photo with them. The student ask the teacher to stand in the middle. There are _____ ways for them to line up.

18 There are _____ ways to make a three-digit number using six digits 2, 4, 6, 8, 9, and 1. (The digits can be used more than once.)

19 There are _____ ways to make a three-digit number without repeating digits using seven digits 1, 2, 3, 4, 5, 6, and 7.

20 There are _____ ways to make a three-digit number without repeating digits using seven digits 0, 1, 3, 5, 7, 8, and 9.

21 Answer the questions.

(1) There are _____ ways to make a four-digit number without repeating digits using seven numbers 1, 2, 4, 5, 6, 7, and 8.

(2) There are _____ ways to make a four-digit number without repeating digits using seven numbers 0, 2, 4, 5, 6, 7, and 8.

(3) There are _____ ways to make a four-digit even number without repeating digits using seven numbers 1, 2, 4, 5, 6, 7, and 8.

(4) There are _____ ways to make a four-digit odd number without repeating digits using seven numbers 1, 2, 4, 5, 6, 7, and 8.

NOTE

NOTE

Crazy Math

AMC 8

1 Annie uses the circle to represent a number, and uses the heart to represent another number. Using the two shapes, she makes 3 equations below. Thus, ● ÷ ♥ = _____ .

● + ♥ = 18
● × ♥ = 45
● − ♥ = 12

A. 1 B. 2 C. 3 D. 4 E. 5

2 What is the simplest form of $\frac{125}{750}$?

A. $\frac{25}{150}$ B. $\frac{5}{30}$ C. $\frac{1}{6}$ D. $\frac{2}{6}$ E. $\frac{6}{30}$

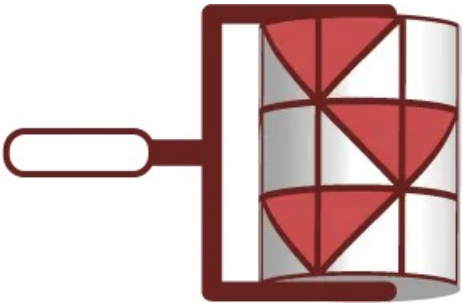
3 The construction team can solve 8 missions of the same kind in 3 days. At this rate, how many missions of the same kind will it solve in 9 weeks?

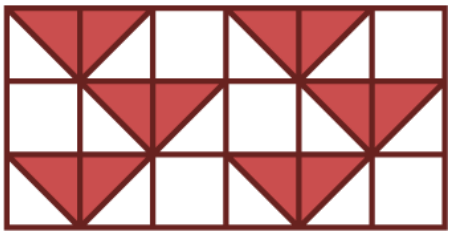
A. 9 B. 35 C. 134 D. 168 E. 342

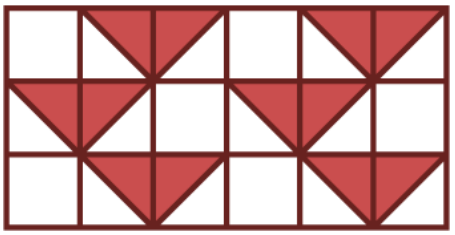
4 In Jane's school, there are 30 students born in April, and each of them was born in a different day. What is the probability of choosing one student who was exactly born in the first ten days of April?

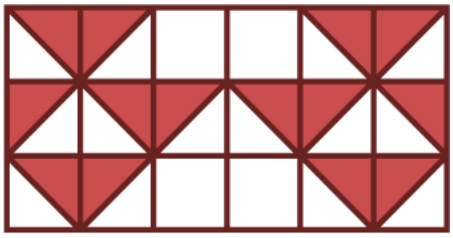
A. $\frac{1}{30}$ B. $\frac{1}{3}$ C. $\frac{1}{4}$ D. $\frac{1}{15}$ E. $\frac{1}{10}$

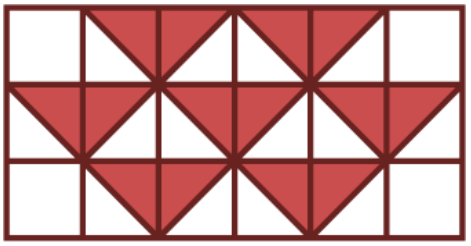
5 Henry uses the roller as shown below to paint the wall of his room. Which of the following could be the pattern of the wall?



A. 

B. 

C. 

D. 

E. None of above is correct.

6 How many different three-digit numbers can we make using $6, 7, 8$, and 9? The digits can be repeated.

A. 16 B. 24 C. 32 D. 64 E. 72

7 Tito has 8 number cards as shown below, and he gives 3 number cards to Carlisle, 2 number cards to Nancy, and 3 number cards to Bella. Each of them multiplies the numbers on the cards they get. The product Carlisle gets is 90, and the product Nancy gets is 28. What is the product Bella gets? (The number cards cannot be rotated.)

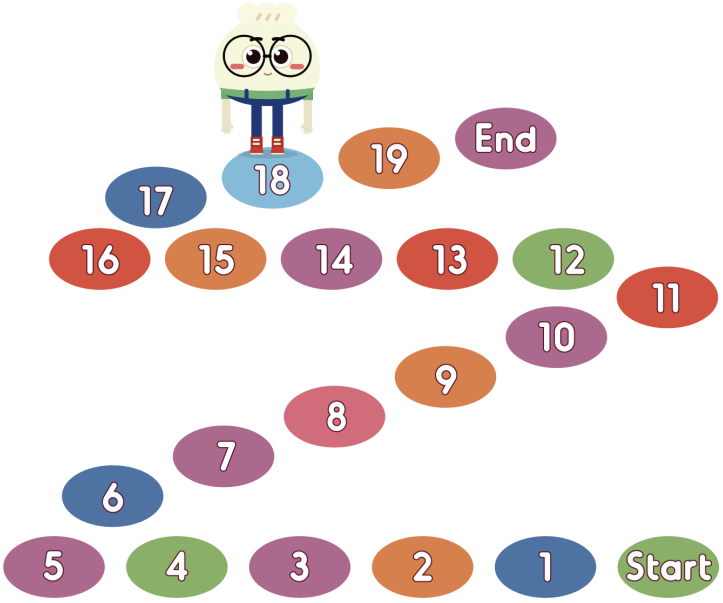
2	3	4	5	6	7	8	9

A. 144 B. 48 C. 72 D. 164 E. 42

8 Mr Thomas bought $\overline{7\square}$ apples for his colleagues. He forgets the exact number of apples. But he knows that he can distribute the apples equally to 3 or 4 colleagues without leftover, respectively. What is the number in the □?

A. 1 B. 2 C. 3 D. 4 E. 5

9 Tom and Joe are playing a jumping game as shown in the figure below. They use rock-paper-scissors to determine the winner in each round. In each round, the winner can go 4 steps, while the loser can go 1 step. After they play 7 rounds, Tom arrives at number 19. Where is Joe?



A. 17 B. 16 C. 15 D. 14 E. The end

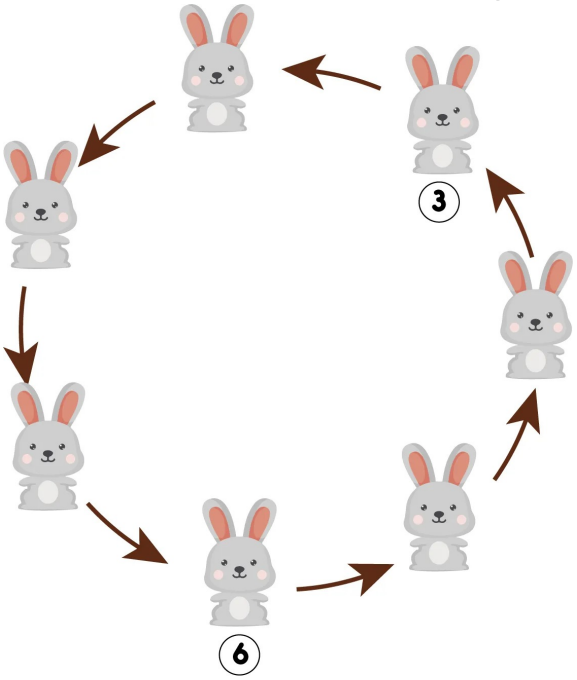
10 When calculating 63×72 , Judy fails to write the correct column multiplication. She writes one of the four digits as 9 and gets a result which has a difference of 432 from the correct one. Which digit does she write incorrectly?

A. 2 B. 3

C. 6 D. 7

E. It's impossible to determine.

11 Amy has 7 rabbits which are numbered from 1 to 7, and they sit in a circle in order of 1 to 7. She distributes 113 carrots to them counterclockwise as shown below. Each rabbit will get 1 carrot each time. Amy gives the first carrot to the rabbit numbered 6. Which rabbit will get the last carrot?

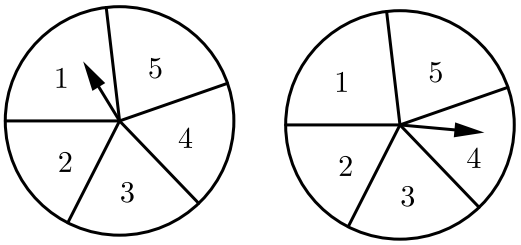


A. 1 B. 2 C. 4 D. 5 E. 6

12 The sum of three 2–digit consecutive numbers is the largest 2–digit number. What is their product?

A. 99 B. 25900 C. 35904 D. 34589 E. 39804

13 The two spinners shown are each spun once and each lands on one of the numbered sectors. The area of each sector is the same for both spinners. What is the probability that the numbers in the two sectors are equal?



A. $\frac{9}{25}$ B. $\frac{2}{5}$ C. $\frac{11}{25}$ D. $\frac{12}{25}$ E. $\frac{1}{5}$

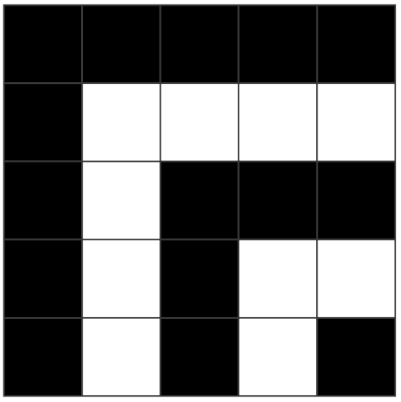
14 The sum of 11 prime numbers is 103. If we want the largest prime number among these 11 numbers to be as small as possible, then this largest prime number is _____ .

A. 17 B. 13 C. 11 D. 5 E. 7

15 Calculate: $170 - 11 + 169 - 12 + 168 - 13 + \cdots + 91 - 90$.

A. 6400 B. 1280 C. 7200 D. 6600 E. 3600

16 Some small squares are shaded in the picture as shown below. The big square has dimensions of 5×5 and is made up of both shaded and white small squares in a certain pattern. Find the difference between the number of shaded squares and white squares in a 12×12 square according to this pattern.



A. 9 B. 10 C. 11 D. 12 E. 13

17 The volume of a cuboid is 512. What is the least sum of the length of all its edges?

A. 36 B. 64 C. 80 D. 96 E. 108

18 Jam has some pieces of candy. He wants to share with some kids. If he shares the candy among 8 kids equally, there will be 2 pieces left. If he shares the candy among 9 kids equally, there will be 3 pieces left. If he shares the candy among 10 kids equally, there will be 4 pieces left. How many pieces of candy are there?

A. 321 B. 354 C. 720 D. 360 E. 240

19 If $x : y = 3 : 7$ and $z : x = 2 : 13$, what is $(x + z) : (y + x)$?

A. $5 : 20$ B. $1 : 4$ C. $9 : 26$ D. $41 : 32$ E. $32 : 41$

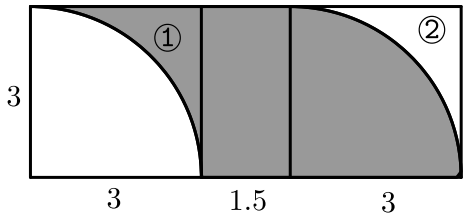
20 Joe writes an expression $\frac{5}{9} \times \frac{9}{13} \times \frac{13}{17} \cdots$ Following the pattern, he writes the expression with $\frac{45}{49}$ as the multiplier in the middle. What is the result of the expression?

A. $\frac{5}{49}$ B. $\frac{5}{89}$ C. $\frac{5}{17}$ D. $\frac{1}{31}$ E. $\frac{5}{81}$

21 If Tina throws 10 dice, what is the probability that the sum of 10 numbers she gets is even?

A. $\frac{33}{49}$ B. $\frac{1}{2}$ C. $\frac{1}{49}$ D. $\frac{1}{8}$ E. $\frac{1}{16}$

22 What is the area of the shaded parts? ($\pi \approx 3$)



A. 3π B. $\frac{9}{4}\pi$ C. 4.5π D. 13.5 E. 18

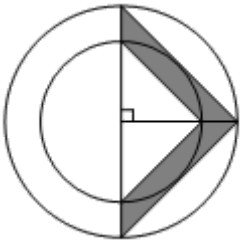
23 If a natural number can be written as the sum of both two and three consecutive natural numbers, then we can call it a Think Number. What is the largest Think Number no larger than 5789?

A. 5786 B. 5787 C. 5788 D. 5789 E. 5784

24 Allen, Tom, and Zoe are planning to buy gifts for each other. They plan to buy gifts using dollars. The number of dollars can only be an integer. The ratio of Allen's budget to Tom's budget is $11 : 9$. The ratio of Tom's budget to Zoe's budget is $3 : 4$. If Zoe plans to spend 120 dollars on the gift. How many dollars will Allen spend on the gift?

A. 90 B. 144 C. 110 D. 120 E. 108

25 The area of the shaded part is 50. What is the area of the whole ring? ($\pi \approx 3.14$)



A. 100 B. 150 C. 157 D. 175 E. 200

26 Calculate:

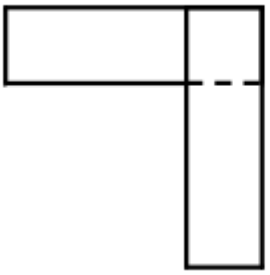
$1 + 3 + 5 + 7 + \cdots + 99 =$ _____ .

27 Given that November 11, 2020 is Wednesday, what day is November 11, 2021?

28 A total of 27 chickens and rabbits are caged together. The number of legs of rabbits is the same as the number of legs of chickens. Thus, there are _____ rabbits in the cage.

29 The teacher divides some balls among 5 students, and the number of balls owned by these students are five consecutive natural numbers. There are 160 balls in total. How many balls does the student with the most balls have?

30 Two rectangular pieces of paper each has a length of 6 cm and a width of 2 cm. These two pieces are put together to form the shape shown below, and the perimeter of the figure is _____ cm.



31 Calculate:

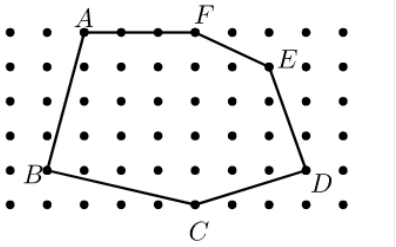
$99.9 - 99.8 + 99.7 - 99.6 + 99.5 - 99.4 + \cdots + 0.3 - 0.2 + 0.1 =$ _____

32 If you need to visit 2 countries in different continents among 4 African countries, 5 Asian countries and 6 American countries, you can make _____ different choices.

33 A train with a length of 100 meters passes through the Thinking Bridge with a length of 2000 meters. The train runs 300 meters per minute. It will take the train _____ minutes to pass the bridge completely.

34 A book has a total of 240 pages. On the first day, Cici read $\frac{1}{3}$ of this book. On the second day, she read $\frac{1}{4}$ of the rest of the book. On the third day, she finished reading this book. She read _____ pages on the third day.

35 On the grids below, the distance between each two adjacent dots is 1. The area enclosed by the polygon below is _____ .



36 Given the sum of three different non-zero natural numbers is 39, their smallest possible product is _____ .

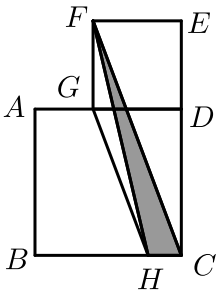
37 Calculate:

$$\left(1-\frac{1}{2}\right)\times\left(2-\frac{2}{3}\right)\times\left(3-\frac{3}{4}\right)\times\left(4-\frac{4}{5}\right)\times\cdots\times\left(8-\frac{8}{9}\right)=_____.$$

38 If the decimal point of a certain decimal is moved one place to the left, the sum of the new decimal and the original decimal is 4.07. Then the original decimal is _____ .

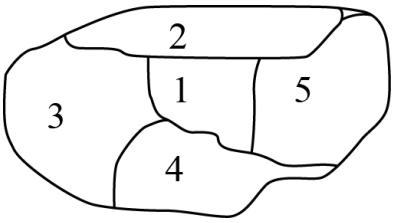
39 Jim is distributing notebooks to his classmates. If each classmate gets 4 notebooks, there will be a lack of 18 notebooks; if each classmate gets 2 notebooks, there will be a surplus of 28 notebooks. Thus, there are _____ notebooks in total.

40 As shown in the figure below, quadrilateral $ABCD$ and quadrilateral $DEFG$ are squares with side lengths of 5 cm and 3 cm, respectively. $GH//CF$. The area of $\triangle CFH$ is _____ cm^2.



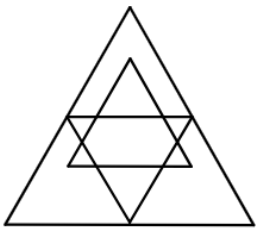
41 _____ is the smallest four-digit number that is divisible by 35.

42 Use 4 colors to paint each part of the figure. If colors in adjacent parts cannot be the same and a part can only be painted one single color, how many ways are there to paint the figure?



43 357 students in the fourth grade of Watermelon Primary School and each student denoted either money or stationery, or both. 235 students donated money and 248 students donated stationery for the children in the earthquake-stricken area. The number of students donated both money and stationery is _____ .

44 There are _____ triangles in the figure below.



45 There are 5 foxes in the forest. A fox who tells lies has 4 tails, and a fox who tells the truth has 3 tails.
A: We have a total of 17 tails.
B: We have a total of 18 tails.
C: We have a total of 19 tails.
D: We have a total of 20 tails.
E: Only one of them is right.
These 5 foxes have a total of _____ tails.

NOTE

Think One on One

1. $1000 - 999 + 998 - 997 + 996 - 995 + \cdots + 4 - 3 + 2 - 1 =$ _____

2. Calculate:

$$\left(1+\frac{1}{2}+\frac{1}{3}+\cdots+\frac{1}{234}\right)\times\left(\frac{1}{2}+\frac{1}{3}+\cdots+\frac{1}{234}+\frac{1}{235}\right)$$
$$-\left(1+\frac{1}{2}+\frac{1}{3}+\cdots+\frac{1}{234}+\frac{1}{235}\right)\times\left(\frac{1}{2}+\frac{1}{3}+\cdots+\frac{1}{234}\right)=_____.$$

3 Calculate:

$0.1 + 0.2 + 0.3 + \cdots + 0.9 + 0.10 + 0.11 + 0.12 + \cdots + 0.98 + 0.99 =$ _____

4 Calculate:

$5015 \times 5016 - 5014 \times 5017 =$ _____

5 Calculate and write the result as a mixed number.

$2013 \times \frac{2011}{2012} =$ _____

6 Find the sum of the digits for the result of 99999×7083.

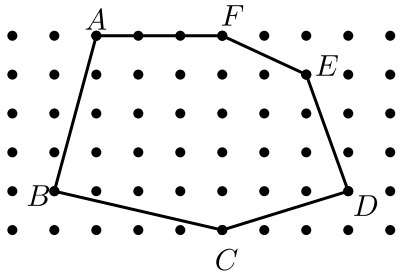
7 There is a decimal with two decimal places. If we delete the decimal point of it, the new number is 47.52 greater than the original decimal. Then the original decimal is _____ .

8 Calculate

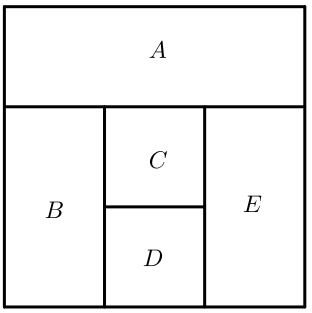
$1997 \times 1995 - 1996 \times 1994 =$ _____

9 What is the integer part of $6.7 + 6.97 + 6.997 + \cdots + 6.9999999999997$?

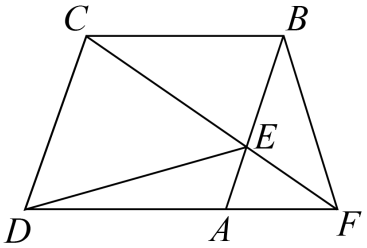
10 The side length of each grid is 1 as shown. Find the area of the figure below.



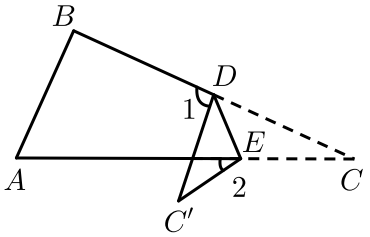
11 Use 4 colors to paint the blocks: A, B, C, D and E (each block can only be one color). If adjacent blocks cannot be of the same color, how many coloring options are there?



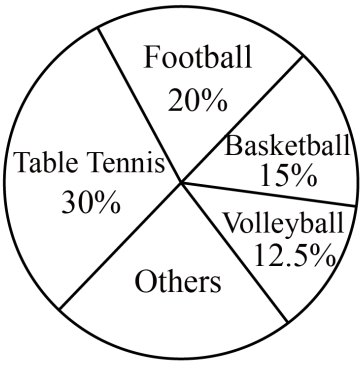
12 As shown in the figure below, in parallelogram $ABCD$, line CF intersects with line AB at E, line CF intersects with the extension of line DA at F. $S_{\triangle DAE} = 18$ cm^2. The area of $\triangle BEF$ is _____ cm^2.



13 Fold a piece of triangle paper along DE as shown below. $\angle A = 65^\circ$, and $\angle B = 75^\circ$. If $\angle 2 = 35^\circ$, then $\angle 1 =$ _____ $^\circ$



14 The pie chart below shows the favorite sports of students in Think Academy. Given 80 students like football the most, _____ students like other sports (other than football, basketball, table tennis, and volleyball) the most in Think Academy.



15 There are altogether 27 squirrels living in three trees. First, 2 squirrels move from Tree A to Tree B. Then, 3 squirrels move from Tree B to Tree C. Lastly, 4 squirrels move from Tree C to Tree A. The three trees now end up with the same amount of squirrels. How many squirrels were living in Tree A at the beginning?

16 Justin is distributing apples to his students. If each student gets 7 apples, three of the students will get nothing; if each student gets 4 apples, there will be a surplus of 15 apples. Thus, there are _____ apples in total.

17 There is a two–shelf bookshelf. Irene finds 11 novels and 10 comic books on the upper shelf, and 8 novels and 6 comic books on the lower shelf. All books are different. Now, Irene takes two books including one novel and one comic book, one from the upper shelf, the other from the lower shelf at the same time. There are in total _____ different choices for Irene to choose from.

18 Peter is at point A and Irene is at point B, and they traveled toward each other and departed at the same time. They were 600 m away from point A when they met for the first time. Then, they continued to move forward and returned immediately after reaching A or B. During the return trips, they met again when they were 100 m away from point B. The distance between point A and point B is _____ m.

19 300 students are attending a competition which contains long-distance running and swimming. 130 boys and 70 girls are competing for long-distance running. 150 boys and 80 girls are competing for swimming. 100 boys attend both races. There are _____ girls who are only competing for swimming.

20 Professor Buqing Su is a famous mathematician in China. Once he met a famous German mathematician on the train. The German mathematician asked an interesting question to Professor Su: "Two people (A and B) travel from two places (100 km apart) at the same time and travel toward each other. A walks 4 km every hour and B walks 6 km every hour. A has a dog and the dog runs 7 km every hour. The dog departs with A and runs toward B, and it turns back toward A once it meets B, and it turns back toward B once it meets A $\cdots$ The dog stops running when A and B meet with each other. How long does the dog travel in total?"
The dog travels _____ km.

21 Four little monkeys have some peaches. The number of peaches that the first monkey has is $\frac{1}{2}$ of the total number of peaches that the other three have. The number of peaches that the second monkey has is $\frac{1}{3}$ of the total number of peaches that the other three have. The number of peaches that the third monkey has is $\frac{1}{4}$ of the total number of peaches that the other three have. The fourth monkey has 26 peaches. How many peaches do the four monkeys have in total?

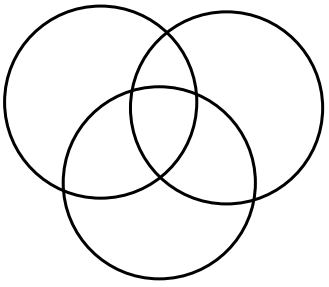
22 _____ is the largest three-digit number that is divisible by 36.

23 Form a number by randomly selecting four digits from $7, 0, 5, 4$, and 9. The largest integer formed that is divisible by 2, 3, and 5 is _____ .

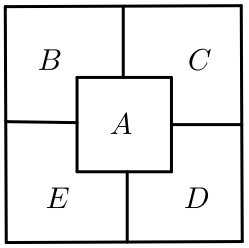
24 Among the natural numbers from 1 to 600 (inclusive), there are _____ numbers that can be divisible by neither 3 nor 4.

25 Given the sum of three different non-zero natural numbers is 38, their largest possible product is _____ .

26 As shown below, the three circles form a figure which has 7 parts. Fill numbers $1 \sim 7$ in the 7 parts below (each number can only be used once) to make the sum of four numbers in each circle be the same. What is the greatest value of the sum?



27 Use 5 colors to paint each part of the figure. If colors in adjacent parts cannot be the same, how many ways of painting are there?



28 Seven students are talking about the day of the week:
The first student says today is Wednesday;
the second says the day after tomorrow is Wednesday;
the third says tomorrow is Wednesday;
the fourth says that today is not Monday, Tuesday and Wednesday;
the fifth says yesterday was Thursday;
the sixth says yesterday was not Saturday;
the last person says tomorrow is Thursday.
It's known that only one of the seven student is right. Then what day is it today?

NOTE

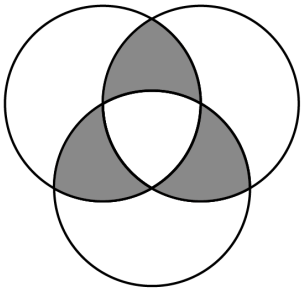
NOTE

Think Cup

1 Vivian creates a new operation: $m@n = m \times m - n \times n$. What is the value of $11@9$?

A. 99 B. 121 C. 81 D. 40 E. 30

2 As shown below, three identical circles overlap with each other. The three shaded parts have the same area of 50, and the middle white part has an (approximately) area of 70. Given that the total area covered by the figure is 610, what is the radius of each circle? ($\pi \approx 3$)

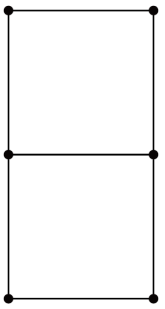


A. 9 B. 10 C. 12 D. 18 E. 21

3 How many 0s are there in the end of the result of the factorial of 25?

A. 2 B. 4 C. 5 D. 6 E. 8

4 Jimmy wants to color all the dots below. If each two adjacent dots (connected by a line segment) cannot be in the same color, at least how many colors of paint does Jimmy need to prepare?



A. 1 B. 2 C. 3 D. 4 E. 5

5 There is a number X. Three times the sum of 4 and number X is 36. What is the value of number X?

A. 2 B. 4 C. 6 D. 8 E. 10

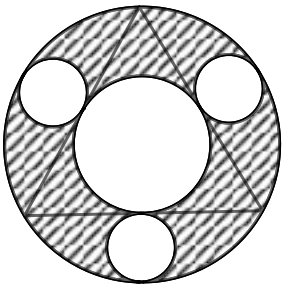
6 Ben the bartender designs a new type of juice, which is made by mixing two different types of beverages. The first beverage has a sugar concentration of 20%. The second beverage has a sugar concentration of 10%. Ben pours 2 L of the first type and 3 L of the second type, and then mixes them together. What is the sugar concentration of the juice now?

A. 12% B. 14% C. 15% D. 16% E. 18%

7 Bob constructs a rectangular building by many $1 \times 1 \times 1$ cubes. The volume of the rectangular building is 210. What is the least sum of all edges of the rectangular building?

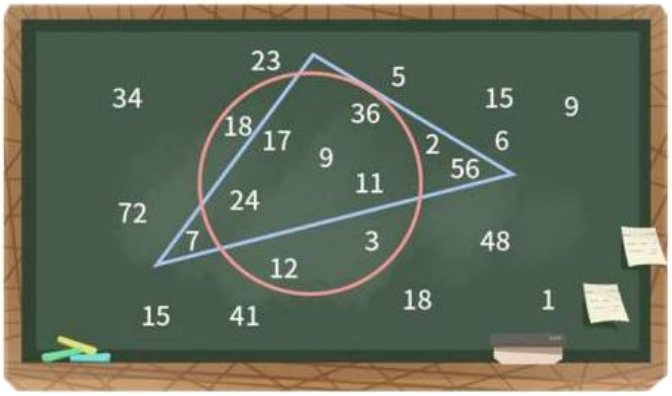
A. 18 B. 80 C. 72 D. 210 E. 116

8 Peter the designer designs a garden as shown below, which is formed by many circles mutually tangent to each other and an equilateral triangle inside. He decides to plant roses in the shaded part, and lavenders in the white part. The total area of the garden is 32. What is the area of the rose part?



A. 10 B. 12 C. 14 D. 16 E. 18

9 Teacher Ivy writes lots of numbers on the blackboard. She uses a blue triangle and a pink circle to frame some numbers. How many numbers inside the triangle but outside the circle that can be divided by 7 without remainder are there?



A. 1 B. 2 C. 3 D. 4 E. 5

10 Choose six different digits among 0 to 9 to fill in each of the following six squares. What is the largest three-digit number we can get as the result?

$$\square + \square\,\square = \square\,\square\,\square$$

A. 104 B. 105 C. 106 D. 107 E. 108

11 Definite @ as the operation of choosing the larger number between two numbers. Definite & as the operation of choosing the smaller number between two numbers. Find the result of $(37\&23) \times (25@45) \div (23@15)$.

A. 23 B. 25 C. 45 D. 225 E. 100

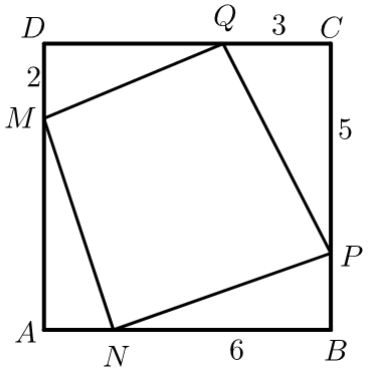
12 What is the result of $1 \div 1\frac{2}{2001} \div 1\frac{2}{2003} \cdots \div 1\frac{2}{2023}$?

A. 1 B. $\frac{2025}{2001}$ C. $\frac{2021}{2025}$ D. $\frac{2001}{2025}$ E. $\frac{1}{2001}$

13 Juliet and Rose are setting off from their own homes toward each other. The distance between their homes is 3000 m. Juliet walks at a speed of 45 m/min, and Rose runs at a speed of 55 m/min. Suppose they keep walking. From now on, after how many minutes can they have a distance of 200 m?

A. 30 B. 29 C. 27 D. 31 E. 32

14 The area of the rectangle below is 56 cm^2. The length of each line segment is shown below. What is the area of quadrilateral $MNPQ$ in cm^2?



A. 29.5 B. 30 C. 32 D. 32.5 E. 36

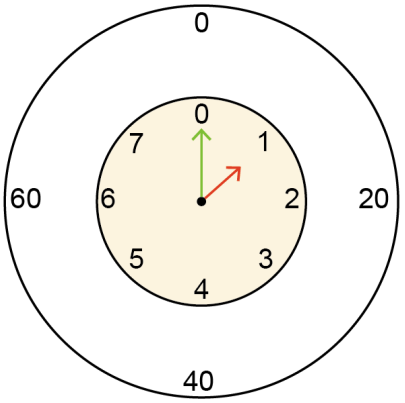
15 Pandora has an opaque box. The box contains nine cards with numbers 1 -9 on them, respectively. Apollo and Artemis each draws three cards from it at the same time. Apollo looks at his three cards and tells Artemis, "the sum of your three numbers cannot be 15." Which number card must Apollo have drawn?

A. 2 B. 4 C. 5 D. 6 E. 8

16 A number is formed by 9 millions, 7 ten thousands, 5 thousands, 8 tens, 2 hundreds and 3 ones. What number is it?

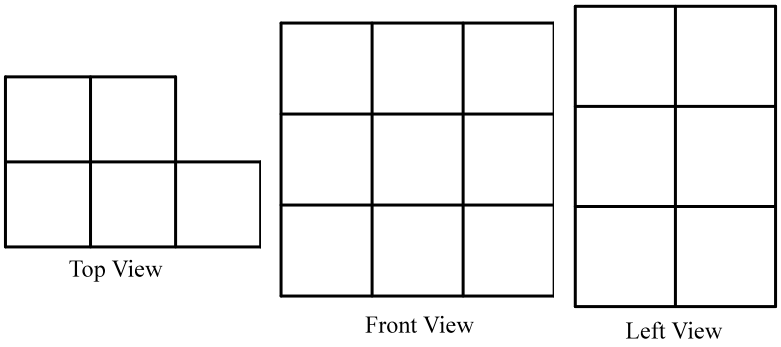
A. 975823 B. 9075823 C. 987532 D. 9075283 E. 9705283

17 Irene invents Irene clock, which is different from the common clock in real world. When the hour hand makes a round, one day passes. The inner circle indicates the hours, and the outer circle indicates the minutes of Irene clock. Given that the 1 o'clock on Irene clock corresponds to 12 P.M. on common clock, what is the time on the common clock corresponding to 3 : 20 on Irene clock?



A. 6 : 45 P.M. B. 2 : 20 P.M. C. 5 : 45 P.M. D. 5 : 15 P.M.
E. 4 : 25 P.M.

18 How many different ways are there to build a solid figure whose three views are shown below?



A. 21 B. 25 C. 9 D. 12 E. 24

19 On 2021 December 31st, Lucas, Jeremy, and Irene visited their grandpa together. Then Lucas visited him every 4 days, Jeremy visited him every 5 days, and Irene visited him every 6 days. In the first three months of 2022, how many days could the grandpa be visited by at least one person?

A. 42 B. 52 C. 45 D. 46 E. 56

20 Vivian has many barbie cards. If she puts 8 cards in each group, there will be 5 cards left. If she puts 9 cards in each group, there will be 3 cards left. If she puts 10 cards in each group, there will be 1 card left. How many cards at least should Vivian take away, so that the remaining number of cards can be divisible by 8, 9, and 10?

A. 36 B. 15 C. 23 D. 21 E. 9

21 What is the result of $\frac{1}{3} \div 1\frac{2}{3} \times \frac{5}{7} \div 1\frac{2}{7} \cdots \times \frac{2021}{2023} \div 1\frac{2}{2023}$?

A. 1 B. 2023 C. $\frac{1}{2025}$ D. $\frac{1}{2023}$ E. $\frac{1}{2021}$

22 There are 20 balls of the same size in a box.

Lucas says: "$\frac{1}{2}$ of them are red."

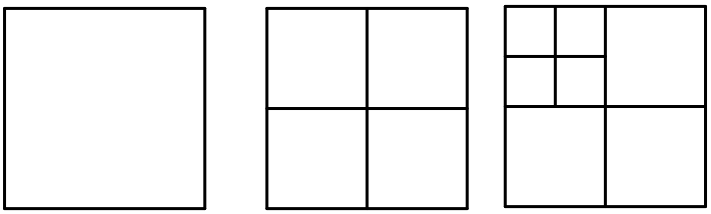
Peter says: "The probability of drawing a green ball without observing them is $\frac{1}{5}$."

Claire says: "There are three colors of balls in the box: red, light blue, and green."

How many dark blue balls are there in the box?

A. 0 B. 4 C. 5 D. 6 E. 10

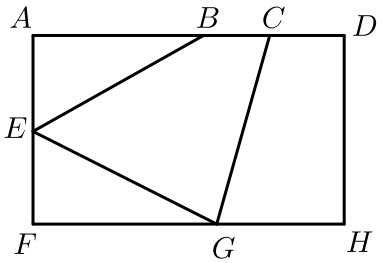
23 Peter keeps dividing the whole square into many small squares as shown below. Then, he paints only one of the smallest squares black in each picture. In which picture the black part will take $\frac{1}{8^8}$ of the whole square?



Picture 1 Picture 2 Picture 3

A. 9 B. 10 C. 11 D. 12 E. 13

24 The picture below is the map of the public garden. Each line segment represents a road in the garden. Bobbie the designer chooses point B as the entrance. If he wants to walk along all the roads without repeating, which point should be set as the exit?



A. C B. A C. H D. G E. E

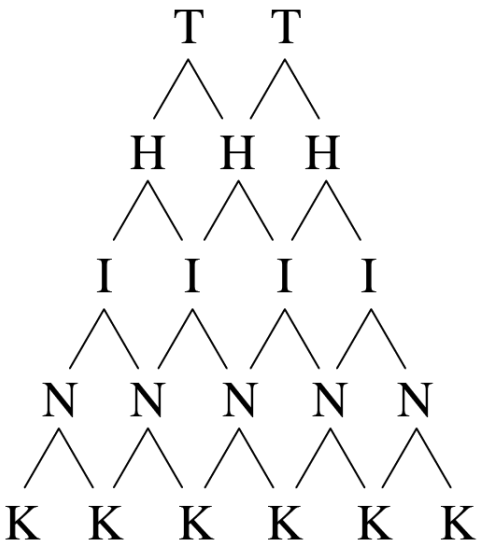
25 Elvis is packing shirts for a trip. He just randomly grabs 3 shirts from his closet without observing them. The closet contains 10 shirts: 5 striped, 3 plaid, and 2 pure-colored ones. What is the probability that he chooses 2 striped shirts and 1 pure-colored shirt?

A. $\frac{1}{2}$ B. $\frac{1}{3}$ C. $\frac{1}{12}$ D. $\frac{1}{6}$ E. $\frac{1}{4}$

26 In Bill's class, every student can play either piano, or violin, or both. 24 of his classmates can play piano, and the number of students that can play violin is half of that of playing piano. If there are 4 students who can play both, how many students are there in the class?

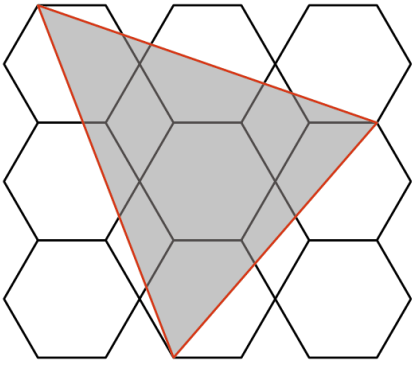
A. 68 B. 20 C. 38 D. 34 E. 32

27 Starting from letter T, how many ways are there to go through the five letters of "THINK" in order? (You can only go along the line segments.)



A. 2^4 B. 3^4 C. 2^5 D. 3^5 E. 4^3

28 The area of each small regular hexagon is 6. What is the area of the shaded triangle?

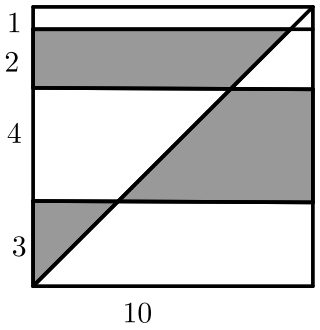


A. 20 B. 22 C. 24 D. 26 E. 28

29 Solve the equation: $30 - 9x = 28 - 5x$.

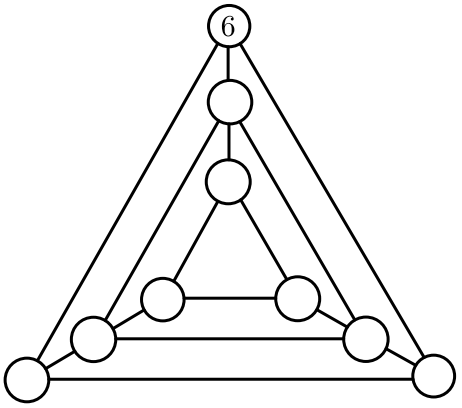
A. $x = 1$ B. $x = 0.5$ C. $x = 2$ D. $x = 1.5$ E. $x = 1.6$

30 What is the total area of the shaded parts?



A. 30 B. 40.5 C. 50.5 D. 45 E. 45.5

31 Fill in $1 \sim 9$ in the 9 ◯s so that the sum of numbers on each of the 3 lines and each of the 3 triangles are the same. Given the position of 6, how many different ways to fill the other 8 numbers? (The figure cannot be rotated or flipped.)



A. 8 B. 7 C. 6 D. 5 E. 4

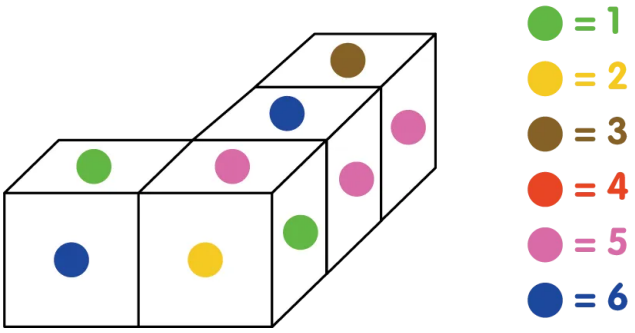
32 Some pirates found lots of gold coins. They divided all the coins equally into 5 groups. Then, the leader of each group would divide the coins he got with his teammates. The 5 groups had 4, 8, 9, 10, and 11 pirates, respectively. In addition, all the leaders found that after they divided the coins evenly, there were always 2 coins left. Which of the following could be the possible range where the number of coins of each group was in?

A. $4150 \sim 4160$ B. $3950 \sim 3960$ C. $4500 \sim 4600$ D. $7920 \sim 7960$
E. $7970 \sim 7980$

33 There is a cuboid with a dimension of $3 \times 4 \times 5$. Now paint all the surfaces red and cut it into many $1 \times 1 \times 1$ cubes. How many cubes that have two faces painted red are there?

A. 24 B. 6 C. 8 D. 11 E. 22

34 James places four identical cubes to form a figure below. There are 6 dots of different colors on the 6 faces, and each color represents a number as shown on the right. What is the sum of four numbers represented by the colors at the bottom of the figure?



A. 18 B. 15 C. 14 D. 13 E. 10

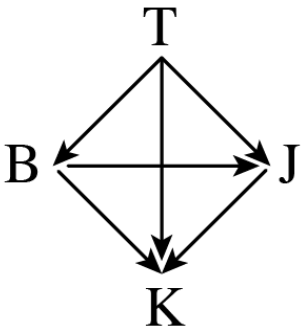
35 After a test, teacher Valeria collects the data of the scores. Given that:
The average score of class A is 76.
The average score of class B is 84.
The average score of class C is 89.
The average score of class A and B is 79.
The average score of all the three classes is 81.
There are 40 students in class A. What is the ratio of number of students of class B to that of C?

A. $3:2$ B. $1:1$ C. $4:1$ D. $5:2$ E. $2:3$

36 What is the product of five fractions, whose denominators are $5-1$ in descending order, and the numerators are $1-5$ in ascending order ?

A. $\frac{1}{25}$ B. $\frac{1}{2}$ C. $\frac{1}{5}$ D. 0 E. 1

37 There are four kids Tom, Jim, Ken, and Bob. The arrows in the figure below show the relationship of their ages. For example, T→J means Tom is younger than Jim. Which of the following is correct if arranging their ages from oldest to youngest?



A. Jim, Ken, Tom, Bob
B. Ken, Bob, Tom, Jim
C. Ken, Jim, Bob, Tom
D. Tom, Bob, Jim, Ken
E. Tom, Jim, Bob, Ken

38 Sana plays a game with the letter cards below. Each time she can only exchange the positions of two adjacent letter cards. How many times of operations at least are needed to change picture 1 into picture 2?

c	d	c	b	e	a

Picture 1

a	b	c	c	d	e

Picture 2

A. 7
B. 8
C. 9
D. 10
E. 11

39 Which expression has the same result as

$1 + 2 + 3 + 4 + 2 + 4 + 6 + 8 + 3 + 6 + 9 + 12 + 4 + 8 + 12 + 16$?

A. $(1 + 2 + 3 + 4) \times 6$

B. $(1 + 2 + 3 + 4)^2$

C. $(16 + 1) \times 16 \div 2$

D. $1 \times 1 + 2 \times 2 + 3 \times 2 + 4 \times 3 + 6 + 8 \times 2 + 12 \times 2 + 16$

E. 4×20

40 Lucy joined a math test which had the scoring rules below: for any correct answer, she got 5 points; for any skipped or wrong answer, she lost 7 points. There were 20 problems in total. When she finished the test, she got only 4 points. How many problems did she answer correct?

A. 4 B. 8 C. 12 D. 16 E. 3

41 What are the last two digits of the result of $1 \times 3 \times 5 \times 7 \times \cdots \times 101$?

A. 05 B. 25 C. 50 D. 55 E. 75

42 $\overline{392AB}$ is a multiple of 45, and $\overline{B34}$ is a three-digit even number. What is the sum of A and B?

A. 13 B. 4 C. 5 D. 7 E. 4 or 13

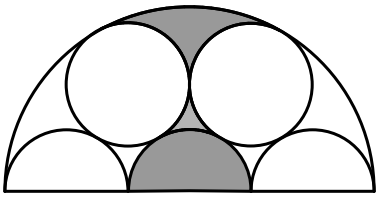
43 On the first day of a 7–day holiday, Judy reads 9 pages of a book. On the second day, she reads 12. Then each day later, she reads 3 pages more than the day before. On the last day of the holiday, she reads the corresponding number of pages and exactly finishes reading the book. How many pages does the book have?

A. 27 B. 30 C. 120 D. 126 E. 128

44 Think Math League has the rule below: each team should join 30 games, and get 3 points for each win, 1 point for each tie, 0 points for each loss. In this season, Joan's team wins the champion by getting a total of 77 points. If the number of games they lose is less than the number of ties, how many games do they win during the season?

A. 25 B. 24 C. 23 D. 22 E. 21

45 As shown below, each two adjacent circles or semicircles are tangent to each other. Given that the radii of the two small circles and the three semicircles are 6, what is the total area of shaded parts?



A. 30π B. 36π C. 48π D. 60π E. 66π

NOTE