



 <https://www.thethinkacademy.com/>

CONTENTS

<i>What is Think Academy?</i>	1
<i>Topic 1: Multiplying Fraction by Whole Number</i>	6
<i>Topic 2: Multiplying Fraction by Fraction</i>	17
<i>Topic 3: Prime Factorization</i>	25
<i>Topic 4: Meeting Problems</i>	36
<i>Topic 5: Chasing Problems</i>	42
<i>Topic 6: Strategy of Finding Areas</i>	46
<i>Answers</i>	53

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
- 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	

Think Academy US ONLINE

Middle School Competition Track

Student Results

2022-2024 AMC8 Number of Students Awarded:



Achievement Roll
(Lower Grade
Achievement Award)



Honor Roll
(National Top 5%)



DHR
(National Top 1%)

2022-2024 AMC10 Number of Students Awarded:



AIME Qualification
(National Top 7%)



Honor Roll
(National Top 5%)



DHR
(National Top 1%)

2024 Think Global IMO Award Winner

7金 1银

金牌总数居全球第一



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.

Course Highlights

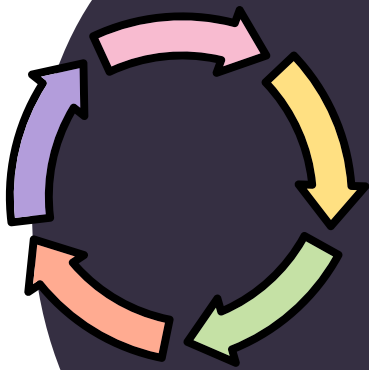
Clear Structure, Worry-Free for Parents

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**

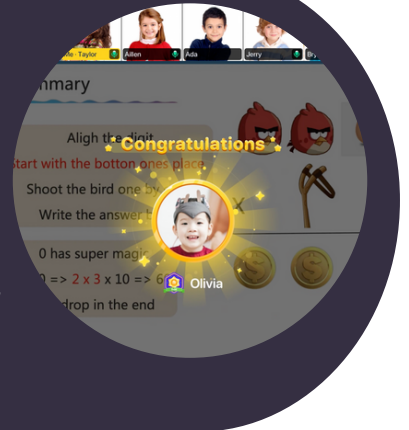


Course Highlights

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**



Topic 1: Multiplying Fraction by Whole Number

(Recommended Learning Time: 4 days)

1 (1) $\frac{1}{7} \times 15 = \underline{\hspace{2cm}}$.

Multiply the numerator by the whole number,
and keep the denominator unchanged:

$$\frac{1}{7} \times 15 = \frac{1 \times 15}{7} = \frac{15}{7}$$

(2) Find the product of $\frac{1}{5}$ and 200.

$$\frac{1}{5} \times 200 = \frac{1 \times 200}{5} = \frac{200}{5} = 40$$



When multiplying a fraction by a whole number, we should multiply the numerator by the whole number, and keep the denominator unchanged. Make sure to get the simplest fraction as the final answer.

2 Which two numbers should be multiplied first?

$$\frac{3}{23} \times 7 = \underline{\hspace{2cm}}$$

A. 3, 7

B. 23, 7

C. 3, 23

3 Which two numbers should be multiplied first?

$$\frac{4}{31} \times 6 = \underline{\hspace{2cm}}$$

A. 4, 6

B. 31, 6

C. 4, 31

4 $\frac{1}{5} \times 7 = \underline{\hspace{2cm}}$

5 $\frac{2}{5} \times 9 = \underline{\hspace{2cm}}$

6 $\frac{1}{4} \times 7 = \underline{\hspace{2cm}}$

7 $\frac{3}{5} \times 12 = \underline{\hspace{2cm}}$

8 $\frac{2}{9} \times 4 = \underline{\hspace{2cm}}$

9 $\frac{4}{13} \times 5 = \underline{\hspace{2cm}}$

10 $\frac{2}{7} \times 3 = \underline{\hspace{2cm}}$

11 $\frac{7}{4} \times 9 = \underline{\hspace{2cm}}$

12 $\frac{4}{9} \times 4 = \underline{\hspace{2cm}}$

13 $\frac{1}{5} \times 8 = \underline{\hspace{2cm}}$

14 $\frac{7}{13} \times 6 = \underline{\hspace{2cm}}$

15 $\frac{7}{31} \times 3 = \underline{\hspace{2cm}}$

16 $\frac{7}{5} \times 15 = \underline{\hspace{2cm}}$

17 $\frac{8}{7} \times 14 = \underline{\hspace{2cm}}$

18 $\frac{7}{4} \times 2 = \underline{\hspace{2cm}}$

19 $\frac{1}{6} \times 72 = \underline{\hspace{2cm}}$

20 $\frac{4}{27} \times 9 = \underline{\hspace{2cm}}$

21 $\frac{17}{9} \times 3 = \underline{\hspace{2cm}}$

22 $\frac{1}{4} \times 4 = \underline{\hspace{2cm}}$

23 $9 \times \frac{5}{18} = \underline{\hspace{2cm}}$

24 $4 \times \frac{4}{11} = \underline{\hspace{2cm}}$

25 $\frac{9}{4} \times 2 = \underline{\hspace{2cm}}$

26 $\frac{2}{7} \times 14 = \underline{\hspace{2cm}}$

27 $\frac{1}{3} \times 18 = \underline{\hspace{2cm}}$

28 $\frac{7}{12} \times 9 = \underline{\hspace{2cm}}$

29 $\frac{5}{12} \times 2 = \underline{\hspace{2cm}}$

30 Calculate:

(1) $\frac{5}{12} \times 2 = \underline{\hspace{2cm}}$

(2) $\frac{7}{13} \times 6 = \underline{\hspace{2cm}}$

(3) $\frac{7}{31} \times 3 = \underline{\hspace{2cm}}$

(4) $\frac{13}{10} \times 3 = \underline{\hspace{2cm}}$

31 Calculate:

(1) $4 \times \frac{7}{3} = \underline{\hspace{2cm}}$

(2) $5 \times \frac{16}{7} = \underline{\hspace{2cm}}$

(3) $4 \times \frac{29}{8} = \underline{\hspace{2cm}}$

(4) $7 \times \frac{9}{7} = \underline{\hspace{2cm}}$

(5) $6 \times \frac{8}{3} = \underline{\hspace{2cm}}$

(6) $2 \times \frac{13}{4} = \underline{\hspace{2cm}}$

32 Calculate:

(1) $5 \times \frac{7}{3} = \underline{\hspace{2cm}}$

(2) $10 \times \frac{13}{5} = \underline{\hspace{2cm}}$

(3) $9 \times \frac{9}{2} = \underline{\hspace{2cm}}$

33 Calculate:

(1) $\frac{4}{3} \times 4 = \underline{\hspace{2cm}}$

(2) $\frac{17}{5} \times 2 = \underline{\hspace{2cm}}$

$$(3) \frac{23}{4} \times 2 = \underline{\hspace{2cm}}$$

$$(4) \frac{17}{8} \times 6 = \underline{\hspace{2cm}}$$

34 Calculate:

$$(1) \frac{3}{8} \times 40 = \underline{\hspace{2cm}}$$

$$(2) 18 \times \frac{5}{9} = \underline{\hspace{2cm}}$$

$$(3) \frac{8}{35} \times 7 = \underline{\hspace{2cm}}$$

$$(4) \frac{5}{21} \times 15 = \underline{\hspace{2cm}}$$

(5) $\frac{8}{49} \times 7 = \underline{\hspace{2cm}}$

(6) $12 \times \frac{5}{8} = \underline{\hspace{2cm}}$

- 35 A cheetah can run 125 kilometers per hour. How many kilometers can it run in $\frac{1}{5}$ hours?

- 36 Calculate: $\frac{7}{18} \times 216$.

Can you think of an easier way to solve the problem?

Topic 2: Multiplying Fraction by Fraction

(Recommended Learning Time: 4 days)

1 (1) Calculate $\frac{4}{9} \times \frac{1}{5}$

When multiplying fractions, we multiply the numerators and the denominators, respectively:

$$\frac{4}{9} \times \frac{1}{5} = \frac{4 \times 1}{9 \times 5} = \frac{4}{45}$$

(2) Calculate $\frac{2}{9} \times \frac{3}{4}$

Method 1:

$$\frac{2}{9} \times \frac{3}{4} = \frac{2 \times 3}{9 \times 4} = \frac{6}{36} = \frac{1}{6}$$

Method 2: Cross-cancellation

When we're multiplying fractions, we can reduce any numerator with any denominator.

$$\frac{\overset{1}{\cancel{2}}}{\underset{3}{\cancel{9}}} \times \frac{\overset{1}{\cancel{3}}}{\underset{2}{\cancel{4}}} = \frac{1 \times 1}{3 \times 2} = \frac{1}{6}$$



1. When multiplying fractions, we multiply the numerators and multiply the denominators, respectively.
2. The Cross-cancellation Method may help you get the answer more quickly!

2 Fill in the blanks.

$$(1) \frac{3}{4} \times \frac{3}{5} = \frac{(\quad) \times (\quad)}{(\quad) \times (\quad)} = \frac{(\quad)}{(\quad)}$$

$$(2) \frac{7}{9} \times \frac{2}{3} = \frac{(\quad) \times (\quad)}{(\quad) \times (\quad)} = \frac{(\quad)}{(\quad)}$$

$$(3) \frac{16}{41} \times \frac{4}{3} = \frac{(\quad) \times (\quad)}{(\quad) \times (\quad)} = \frac{(\quad)}{(\quad)}$$

$$3 \quad \frac{3}{13} \times \frac{5}{4} = \underline{\hspace{2cm}}$$

4 Choose the correct steps to calculate $\frac{2}{7} \times \frac{4}{5}$.

A. $\frac{2}{7} \times \frac{4}{5} = \frac{2 \times 5}{4 \times 7} = \frac{10}{28} = \frac{5}{14}$

B. $\frac{2}{7} \times \frac{4}{5} = \frac{4 \times 7}{2 \times 5} = \frac{28}{10} = \frac{14}{5}$

C. $\frac{2}{7} \times \frac{4}{5} = \frac{2 \times 4}{7 \times 5} = \frac{8}{35}$

5 Calculate:

(1) $\frac{3}{5} \times \frac{1}{2} = \underline{\hspace{2cm}}$

(2) $\frac{7}{17} \times \frac{2}{3} = \underline{\hspace{2cm}}$

6 Calculate:

(1) $\frac{7}{9} \times \frac{14}{3} = \underline{\hspace{2cm}}$

(2) $\frac{2}{9} \times \frac{4}{3} = \underline{\hspace{2cm}}$

7 Calculate:

(1) $\frac{1}{5} \times \frac{1}{6} = \underline{\hspace{2cm}}$

(2) $\frac{5}{2} \times \frac{7}{13} = \underline{\hspace{2cm}}$

(3) $\frac{10}{3} \times \frac{5}{21} = \underline{\hspace{2cm}}$

(4) $\frac{2}{9} \times \frac{14}{3} = \underline{\hspace{2cm}}$

(5) $\frac{7}{3} \times \frac{7}{10} = \underline{\hspace{2cm}}$

(6) $\frac{2}{9} \times \frac{4}{3} = \underline{\hspace{2cm}}$

8 Calculate:

(1) $\frac{5}{6} \times \frac{1}{2} = \underline{\hspace{2cm}}$

(2) $\frac{11}{10} \times \frac{7}{9} = \underline{\hspace{2cm}}$

(3) $\frac{5}{18} \times \frac{5}{2} = \underline{\hspace{2cm}}$

(4) $\frac{5}{11} \times \frac{6}{7} = \underline{\hspace{2cm}}$

9 $\frac{2}{5} \times \frac{11}{13} = \underline{\hspace{2cm}}$

10 Calculate:

(1) $\frac{3}{4} \times \frac{1}{5} = \underline{\hspace{2cm}}$

(2) $\frac{2}{11} \times \frac{5}{3} = \underline{\hspace{2cm}}$

11 Calculate:

(1) $\frac{5}{8} \times \frac{7}{9} = \underline{\hspace{2cm}}$

(2) $\frac{3}{4} \times \frac{9}{7} = \underline{\hspace{2cm}}$

(3) $\frac{61}{2} \times \frac{1}{37} = \underline{\hspace{2cm}}$

(4) $\frac{15}{14} \times \frac{3}{8} = \underline{\hspace{2cm}}$

12 Calculate:

(1) $\frac{3}{8} \times \frac{7}{10} = \underline{\hspace{2cm}}$

(2) $\frac{13}{2} \times \frac{1}{7} = \underline{\hspace{2cm}}$

(3) $\frac{15}{2} \times \frac{1}{37} = \underline{\hspace{2cm}}$

(4) $\frac{3}{4} \times \frac{7}{25} = \underline{\hspace{2cm}}$

13 Calculate: (Write the answer in the simplest form.)

(1) $\frac{9}{25} \times \frac{25}{18} = \frac{9 \times 25}{25 \times 18} = \underline{\hspace{2cm}}$

(2) $\frac{7}{12} \times \frac{3}{14} = \frac{7 \times 3}{12 \times 14} = \underline{\hspace{2cm}}$

$$14 \quad \frac{6}{7} \times \frac{2}{3} = \frac{(\quad) \times (\quad)}{(\quad) \times (\quad)} = \frac{(\quad)}{(\quad)}$$

15 Simplify before finding the product.

$$(1) \quad \frac{3}{8} \times \frac{5}{9} = \frac{(\quad) \times (\quad)}{(\quad) \times (\quad)} = \frac{(\quad)}{(\quad)}$$

$$(2) \quad \frac{16}{41} \times \frac{4}{3} = \frac{(\quad) \times (\quad)}{(\quad) \times (\quad)} = \underline{\hspace{2cm}}$$

$$16 \quad \frac{24}{31} \times \frac{31}{8} = \frac{(\quad) \times (\quad)}{(\quad) \times (\quad)} = \underline{\hspace{2cm}}$$

Topic 3: Prime Factorization

(Recommended Learning Time: 4 days)

1 Find the prime factorization of 60.

Prime factorization is the process of finding the prime numbers, which are multiplied together to get the original number.

Ladder Method:

Prime factor

$$\begin{array}{r|l} 2 & 60 \\ \hline 3 & 30 \\ \hline 3 & 15 \\ \hline 5 & \end{array}$$

5 → 5 is a prime number. Stop here!

$$60 = 2 \times 2 \times 3 \times 5$$

Prime factorization of 60:

$$60 = 2^2 \times 3 \times 5$$



Use ladder method to find the prime factorization of a number:

1. Keep finding the prime factors of the number on the ladder and write it on the left side of the ladder.
2. Divide the number inside the ladder by the prime factor and write the quotient under the ladder.
3. Keep repeating the previous steps until the quotient is prime.
4. The multiplication of all prime factors we find is the prime factorization.

2 Find the prime factorizations of the following numbers:

(1) 18

(2) 48

(3) 75

(4) 255

(5) 729

(6) 2431

3 Find the prime factorizations of the following numbers:

(1) 15

(2) 33

(3) 85

(4) 128

(5) 385

(6) 1547

4 Find the prime factorizations of the following numbers:

(1) 39

(2) 56

(3) 84

(4) 136

(5) 284

(6) 666

5 Find the prime factorizations of the following numbers:

(1) 24

(2) 72

(3) 180

(4) 195

(5) 380

(6) 2002

6 Find the prime factorizations of the following numbers:

(1) 80

(2) 120

(3) 264

(4) 525

(5) 1236

(6) 5292

7 Find the prime factorizations of the following numbers:

(1) 123

(2) 135

(3) 112

(4) 372

(5) 1008

(6) 6669

8 Find the prime factorizations of the following numbers:

(1) 1001

(2) 2015

(3) 2016

(4) 2431

9 Find the prime factorizations of the following numbers:

(1) 38×105

(2) 24×175

(3) 36×144

(4) 164×225

10 The product of three consecutive natural numbers is 210. What are these three natural numbers?

11 The product of three consecutive natural numbers is 720. The sum of the three natural numbers is _____ .

12 The product of three consecutive odd natural numbers is 315. The sum of these three consecutive odd numbers is _____ .

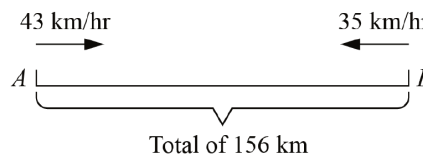
13 The product of three even numbers is 168. What are these three even numbers?

Topic 4: Meeting Problems

(Recommended Learning Time: 3 days)

- 1 As shown below, Peter and Victoria are walking toward each other at the same time from City A and City B of which the distance is 156 km. Peter travels at a speed of 43 km/hr and Victoria travels at a speed of 35 km/hr. They will meet in _____ hours.

First, draw a graph.



Second, find the total distance that Peter and Victoria can cover per hour (the sum of two people's speeds):

$$43 + 35 = 78 \text{ km per hour}$$

Because they will meet when they finish a total of 156 km together:

$$T = D \div V_{\text{sum}} = 156 \div 78 = 2 \text{ hr.}$$

They will meet in 2 hr.



The key to meeting problems is the sum of speeds. Besides, a nice graph will help you to solve travel word problems.

2 Andy and Robert ride at speeds of 15 km/h and 12 km/h, respectively.

(1) If they start towards each other from two places 108 km apart at the same time, how long does it take until they meet?

(2) If they start toward each other from A and B respectively at the same time, they will meet in 3 hours. How far is A from B ?

(3) C is 120 kilometers away from D . Andy and Alex bike towards each other from C and D respectively at the same time. It takes them 5 hours to meet. Find Alex's speed.

3 Thomas and Charles drive from A and B respectively at the same time. Given that Thomas' speed is 45 miles per hour and Charles' speed is 90 miles per hour, they will meet in 6 hours.

(1) What's the distance between A and B ?

(2) If Charles' car breaks down unexpectedly, he would move on after 3 hours of repairing. How long will it take for them to meet?

4 Adam and Peter walk toward each other from their respective homes and it takes 2 hours for them to meet. Given that Adam walks 8 kilometers per hour and Peter walks 6 kilometers per hour, what's the distance between their homes?

- 5 Bobby and Tyler live 45 miles away. One day, they cycled toward each other from their home at the same time. Bobby cycled at a speed of 5 miles per hour and Tyler at 4 miles per hour. How long did it take for them to meet?
- 6 Adam and Peter depart at the same time respectively from A and B which are 800 meters apart and run toward each other. Adam's speed is 5 meters per second. Given that it takes them 100 seconds to meet, what's Peter's speed?
- 7 A is 90 meters apart from B . It takes Adam 15 seconds to run from A to B and takes Peter 30 seconds. If Adam and Peter run toward each other from A and B respectively, how long will it take them to meet?

- 8 Adam's home is 3300 meters away from Peter's. They start from their respective homes and walk toward each other. If they have already walked 15 minutes, given that Adam's speed is 92 meters per minute and Peter's speed is 73 meters per minute, how long will it take for them to meet?
- 9 A and B are 350 miles away. James departs at 8 A.M. from A to B and drives at a speed of 40 miles per hour. 2 hours later, Louis drives from B to A at a speed of 50 miles per hour. When will they meet with each other?
- 10 Andy and Robert start off at speeds of 6 km/h and 4 km/h from A and B , respectively. A is 30 km away from B .
(1) If they go toward each other, how long does it take them to meet?

(2) If they travel away from each other, how far will they be in 3 hours?

(3) If they travel toward each other, how long will it take them to be 10 kilometers apart for the first time?

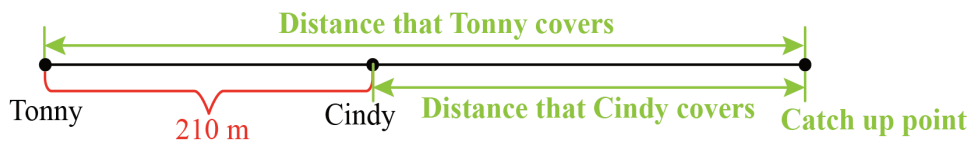
(4) How long will it take them to be 10 kilometers away from each other for the second time?

Topic 5: Chasing Problems

(Recommended Learning Time: 3 days)

- 1 The distance between Tonny's home and Cindy's home is 210 m. One day, Tonny and Cindy start from their home at the same time and toward the same direction. Tonny's speed is 75 m/min and Cindy's speed is 45 m/min. How long will it take Tonny to catch up with Cindy?

First, draw a graph.



Second, find the distance that Tonny covers more than Cindy per minute, which is also the difference between Tonny's speed and Cindy's speed:

$$75 - 45 = 30 \text{ m/min}$$

Because when Tonny catches up with Cindy, the total distance that Tonny covers more than Cindy is just 210 m.

Therefore:

$$T = D_{\text{difference}} \div V_{\text{difference}} = 210 \div 30 = 7 \text{ min.}$$

Tonny will catch up with Cindy in 7 min.



The key to chasing problems is the difference between two people's speeds.

- 2 Ella and Mia both start in the same direction from two places which are 400 meters apart. Ella is chasing Mia. Ella rides a bicycle at the speed of 450 meters per minute, and Mia runs 250 meters per minute. Assume their speeds are unchanged. How long will it take for Ella to catch up with Mia?
- 3 Julian and Sophia are driving from the same place in the same direction. Julian's driving speed is 70 kilometers per hour and Sophia's driving speed is 80 kilometers per hour. When Julian has traveled 10 kilometers, Sophia starts off. Assume their speeds are unchanged. When will Sophia catch up with Julian?
- 4 Joseph lives 18 kilometers east of Laura. One day, they decided to travel west from their respective home at the same time. Joseph rode a bike at a constant speed of 14 km/h and Laura walked at a constant speed of 5 km/h. How long did it take Joseph to catch up with Laura?

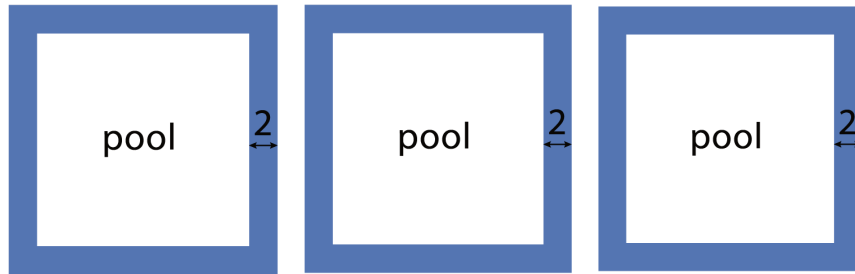
- 5 Andy and Robert are walking to the cinema from school. Andy walks at a speed of 60 meters per minute and Robert walks at 80 meters per minute. Andy departs 5 minutes before Robert departs and they will arrive at the cinema at the same time. Assume their speeds are unchanged. What is the distance between their school and the cinema?
- 6 Bran and David walk from A in the same direction. Bran walks 45 meters per minute and David walks 70 meters per minute. Assume their speeds are unchanged. What will the distance between them be in 10 minutes?
- 7 Laura and Roy bike from their school to the park. Roy bikes 12 km/h and Laura bikes 15 km/h. Laura departs after Roy has traveled 3 km ahead. When she catches up with Roy, there remains a distance of 3 km from the park. What is the distance between the school and the park?

- 8 A is 800 meters away from B . Roy and Lucy start at the same time from A and B respectively and walk in the same direction. Lucy is ahead of Roy and her speed is 80 m/min. Assume their speeds are unchanged. If Roy wants to catch up with Lucy in 16 minutes, how fast should he walk?
- 9 Aiden is biking home from school at a speed of 80 meters per minute. His younger brother Henry bikes off school at 200 meters per minute 12 minutes after Aiden's departure. Assume their speeds are unchanged. When will Henry catch up with Aiden?
- 10 Robert walks home from school at a constant speed of 50 m/min. Alex starts biking 12 min after Robert's departure, and catches up with Robert at a distance of 1000 m from the school. Assume their speeds are unchanged. Find Alex's biking speed.

Topic 6: Strategy of Finding Areas

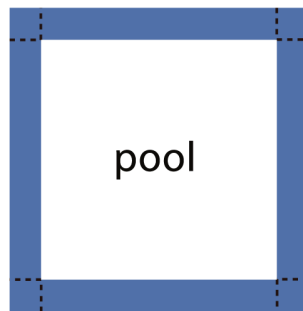
(Recommended Learning Time: 3 days)

- 1 Around a square pool, there is a road that is 2 m wide as shown below. The side length of the square pool is 13 m. Can you use more than one way to find the area of the road?



Method 1:

Divide the figure into four identical rectangles and four identical squares as shown below.



Area of four identical squares: $2 \times 2 \times 4 = 16 \text{ m}^2$.

Area of four identical rectangles: $13 \times 2 \times 4 = 104 \text{ m}^2$.

Area of the road: $104 + 16 = 120 \text{ m}^2$.

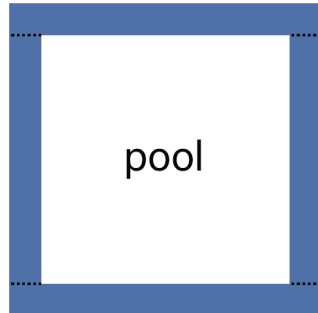
Method 2:

Area of the road = Area of the bigger square - Area of the smaller square

Area of the road: $(13 + 2 + 2) \times (13 + 2 + 2) - 13 \times 13 = 120 \text{ m}^2$.

Method 3:

Divide this road into four rectangles as shown below, with two of them having a length of $13 + 2 + 2 = 17$ and a width of 2, and another two of them having a length of 13 and a width is 2.

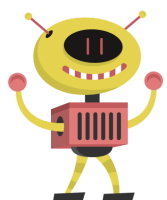


Area of the road: $17 \times 2 \times 2 + 13 \times 2 \times 2 = 120 \text{ m}^2$.

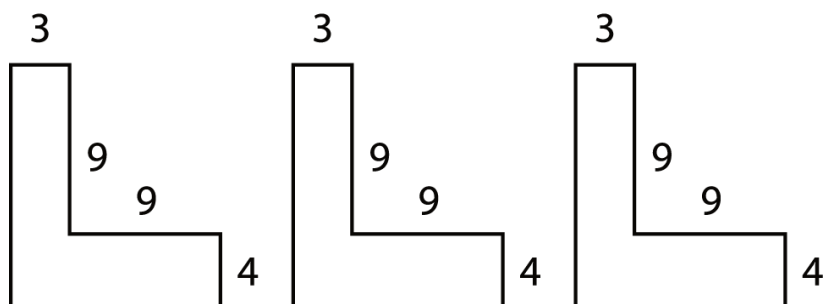


To find the area of irregular shapes, we can cut the irregular shape into several pieces and rearrange them into regular shape(s).

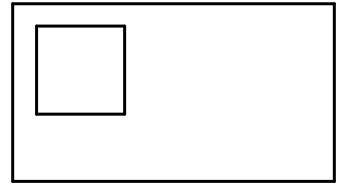
2



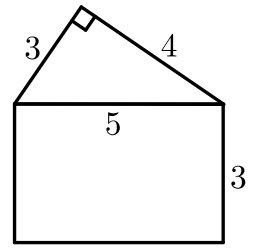
Can you use more than one way to find the area of the irregular shape below ?



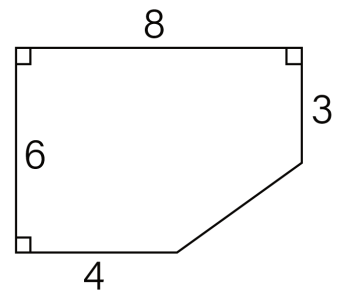
- 3 As shown in the figure below, cut off a small square with the side length of 6 from the rectangle, where the length is 20 and the width is 12. Find the area of the remaining figure.



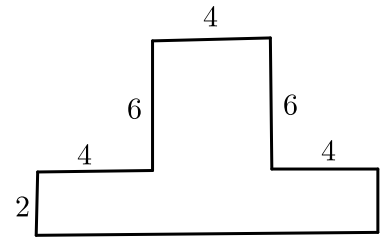
- 4 The figure below consists of a rectangle and a right triangle. Find the area of the entire figure.



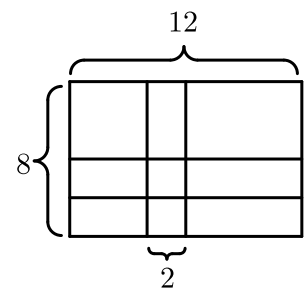
- 5 Find the area of the pentagon below. (Unit: centimeters)



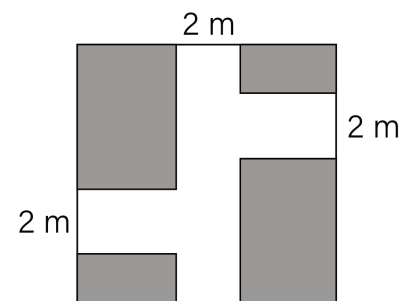
- 6 Find the perimeter and area of the figure below, respectively.



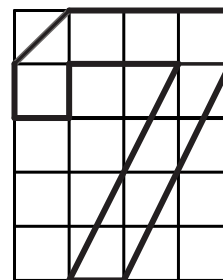
- 7 As shown in the figure below, there are two stone pathways in a rectangular flowerbed, which are both 2 meters wide and perpendicular to each other. The length of flowerbed is 12 m and the width is 8 m. Find the area where flowers can be grown.



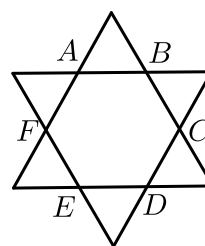
- 8 As shown in the figure below, there is a square lawn with the side length of 8 m. Bob is building a pathway with the width of 2 m, which is shown as the blank region. Find the area of the shaded region.



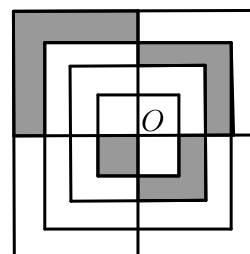
- 9 As shown in the grid below, the area of each square is 1. Find the area of the figure in the grid.



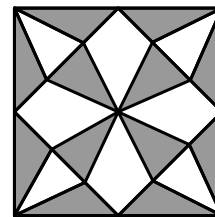
- 10 The area of regular hexagon $ABCDEF$ is 1 m^2 . Extend each side of hexagon from each vertex for its length to form the figure below. Find the area of the figure.



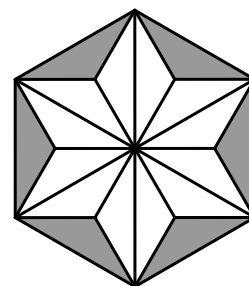
- 11 As shown in the figure below, point O is the center of the four squares, where the side lengths are 4, 6, 8, and 10, respectively. Find the area of the shaded region.



- 12 As shown in the figure below, the side length of the larger square is 10 cm. Connect each midpoint on each side of the larger square to form a smaller square. Then, divide each side of the smaller square into three parts evenly and connect both endpoints of the middle line segment with a vertex and the center of the larger square. Find the total area of the shaded region.



- 13 As shown in the figure below, a regular hexagon is divided into some identical triangles. The area of blank region is 100 cm^2 larger than that of the shaded region. Find the area of the shaded region.



Topic 1: Multiplying Fraction by Whole Number

(Recommended Learning Time: 4 days)

1. $(1) \frac{1}{7} \times 15 = \frac{1 \times 15}{7} = \frac{15}{7}$

$(2) \frac{1}{5} \times 200 = \frac{1 \times 200}{5} = \frac{200}{5} = 40$

2. A

3. A

4. $\frac{7}{5}$

5. $\frac{18}{5}$

6. $\frac{7}{4}$

7. $\frac{36}{5}$ Alternative $7\frac{1}{5}$

8. $\frac{8}{9}$

9. $\frac{20}{13}$ Alternative $1\frac{7}{13}$

10. $\frac{6}{7}$

11. $\frac{63}{4}$ Alternative $15\frac{3}{4}$

12. $\frac{16}{9}$ Alternative $1\frac{7}{9}$

13. $\frac{8}{5}$ Alternative $1\frac{3}{5}$

14. $\frac{42}{13}$

15. $\frac{21}{31}$

16. 21

17. 16

18. $\frac{7}{2}$ Alternative $3\frac{1}{2}$

19. 12

20. $\frac{4}{3}$ Alternative $1\frac{1}{3}$

21. $\frac{17}{3}$ Alternative $5\frac{2}{3}$
22. 1
23. $\frac{5}{2}$
24. $\frac{16}{11}$
25. $\frac{9}{2}$ Alternative $4\frac{1}{2}$
26. 4
27. 6
28. $\frac{21}{4}$ Alternative $5\frac{1}{4}$
29. $\frac{5}{6}$
30. (1) $\frac{5}{6}$
 (2) $\frac{42}{13}$
 (3) $\frac{21}{31}$
 (4) $\frac{39}{10}$
31. (1) $\frac{28}{3}$
 (2) $\frac{80}{7}$
 (3) $\frac{29}{2}$
 (4) 9
 (5) 16
 (6) $\frac{13}{2}$
32. (1) $\frac{35}{3}$
 (2) 26
 (3) $\frac{81}{2}$
33. (1) $\frac{16}{3}$
 (2) $\frac{34}{5}$
 (3) $\frac{23}{2}$
 (4) $\frac{51}{4}$

34. (1) 15
 (2) 10
 (3) $\frac{8}{5}$
 (4) $\frac{25}{7}$
 (5) $\frac{8}{7}$
 (6) $\frac{15}{2}$
35. 25
36. 84

Topic 2: Multiplying Fraction by Fraction

(Recommended Learning Time: 4 days)

1. N/A
2. (1) $\frac{3}{4} \times \frac{3}{5} = \frac{3 \times 3}{4 \times 5} = \frac{9}{20}$
 (2) $\frac{7}{9} \times \frac{2}{3} = \frac{7 \times 2}{9 \times 3} = \frac{14}{27}$
 (3) $\frac{16}{41} \times \frac{4}{3} = \frac{16 \times 4}{41 \times 3} = \frac{64}{123}$
3. $\frac{15}{52}$
4. C
5. (1) $\frac{3}{10}$
 (2) $\frac{14}{51}$
6. (1) $\frac{98}{27}$
 (2) $\frac{8}{27}$
7. (1) $\frac{1}{30}$
 (2) $\frac{35}{26}$
 (3) $\frac{50}{63}$
 (4) $\frac{28}{27}$
 (5) $\frac{49}{30}$
 (6) $\frac{8}{27}$

$$8. \quad (1) \frac{5}{\frac{12}{77}}$$

$$(2) \frac{90}{25}$$

$$(3) \frac{36}{30}$$

$$(4) \frac{30}{77}$$

$$9. \quad \frac{22}{65}$$

$$10. \quad (1) \frac{3}{\frac{20}{10}}$$

$$(2) \frac{33}{27}$$

$$11. \quad (1) \frac{35}{\frac{72}{27}}$$

$$(2) \frac{28}{61}$$

$$(3) \frac{74}{45}$$

$$(4) \frac{112}{21}$$

$$12. \quad (1) \frac{80}{13}$$

$$(2) \frac{14}{15}$$

$$(3) \frac{74}{21}$$

$$(4) \frac{100}{1}$$

$$13. \quad (1) \frac{1}{2}$$

$$(2) \frac{1}{8}$$

$$14. \quad \frac{6}{7} \times \frac{2}{3} = \frac{2 \times 2}{7 \times 1} = \frac{4}{7}$$

$$15. \quad (1) \frac{3}{8} \times \frac{5}{9} = \frac{3 \times 5}{8 \times 9} = \frac{5}{24}$$

$$(2) \frac{16}{41} \times \frac{4}{3} = \frac{16 \times 4}{41 \times 3} = \frac{64}{123}$$

$$16. \quad \frac{24}{31} \times \frac{31}{8} = \frac{3 \times 1}{1 \times 1} = 3$$

Topic 3: Prime Factorization

(Recommended Learning Time: 4 days)

1. N/A
2.
 - (1) $18 = 2 \times 3^2$
 - (2) $48 = 2^4 \times 3$
 - (3) $75 = 3 \times 5^2$
 - (4) $255 = 3 \times 5 \times 17$
 - (5) $729 = 3^6$
 - (6) $2431 = 11 \times 13 \times 17$
3.
 - (1) $15 = 3 \times 5$
 - (2) $33 = 3 \times 11$
 - (3) $85 = 5 \times 17$
 - (4) $128 = 2^7$
 - (5) $385 = 5 \times 7 \times 11$
 - (6) $1547 = 7 \times 13 \times 17$
4.
 - (1) $39 = 3 \times 13$
 - (2) $56 = 2^3 \times 7$
 - (3) $84 = 2^2 \times 3 \times 7$
 - (4) $136 = 2^3 \times 17$
 - (5) $284 = 2^2 \times 71$
 - (6) $666 = 2 \times 3^2 \times 37$
5.
 - (1) $24 = 2^3 \times 3$
 - (2) $72 = 2^3 \times 3^2$
 - (3) $180 = 2^2 \times 3^2 \times 5$
 - (4) $195 = 3 \times 5 \times 13$
 - (5) $380 = 2^2 \times 5 \times 19$
 - (6) $2002 = 2 \times 7 \times 11 \times 13$
6.
 - (1) $80 = 2^4 \times 5$
 - (2) $120 = 2^3 \times 3 \times 5$
 - (3) $264 = 2^3 \times 3 \times 11$
 - (4) $525 = 3 \times 5^2 \times 7$
 - (5) $1236 = 2^2 \times 3 \times 103$
 - (6) $5292 = 2^2 \times 3^3 \times 7^2$

7. (1) $123 = 3 \times 41$
 (2) $135 = 3^3 \times 5$
 (3) $112 = 2^4 \times 7$
 (4) $372 = 2^2 \times 3 \times 31$
 (5) $1008 = 2^4 \times 3^2 \times 7$
 (6) $6669 = 3^3 \times 13 \times 19$
8. (1) $1001 = 7 \times 11 \times 13$
 (2) $2015 = 5 \times 13 \times 31$
 (3) $2016 = 2^5 \times 3^2 \times 7$
 (4) $2431 = 11 \times 13 \times 17$
9. (1) $38 \times 105 = 2 \times 3 \times 5 \times 7 \times 19$
 (2) $24 \times 175 = 2^3 \times 3 \times 5^2 \times 7$
 (3) $36 \times 144 = 2^6 \times 3^4$
 (4) $164 \times 225 = 2^2 \times 3^2 \times 5^2 \times 41$
10. 5, 6, 7
11. 27
12. 21
13. 2, 6, 14

Topic 4: Meeting Problems

(Recommended Learning Time: 3 days)

1. N/A
2. (1) 4 hours
 (2) 81 km
 (3) 9 km/h
3. (1) 810 miles
 (2) 8 hours
4. 28 kilometers
5. 5 hours
6. 3 m/s
7. 10 seconds
8. 5 minutes
9. They will meet at 1 p.m..
10. (1) 3 hours
 (2) 60 km
 (3) 2 hours
 (4) 4 hours

Topic 5: Chasing Problems

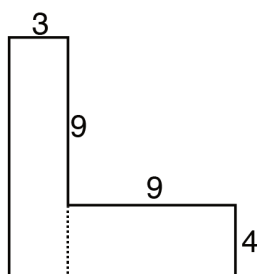
(Recommended Learning Time: 3 days)

1. N/A
2. 2 min
3. In 1 hour
4. 2 hours
5. 1200 meters
6. 250 meters
7. 18 km
8. 130 m/min
9. In 8 minutes
10. 125 m/min

Topic 6: Strategy of Finding Areas

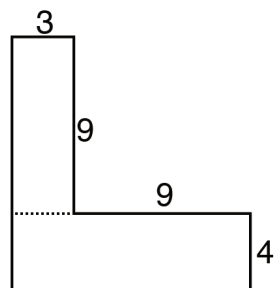
(Recommended Learning Time: 3 days)

1. N/A
2. Method 1:



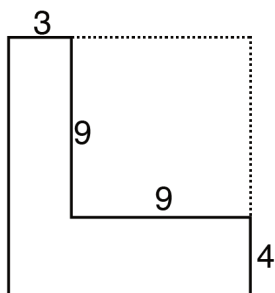
$$3 \times (9 + 4) + 9 \times 4 = 75$$

Method 2:



$$(9 + 3) \times 4 + 9 \times 3 = 75$$

Method 3:



$$(9 + 4) \times (9 + 3) = 156; 156 - 9 \times 9 = 75.$$

3. 204
4. 21
5. 42 cm^2
6. 40; 48
7. 60 m^2
8. 36 m^2
9. 8.5
10. 2 m^2
11. 25
12. 50 cm^2
13. 100 cm^2



 <https://www.thethinkacademy.com/>