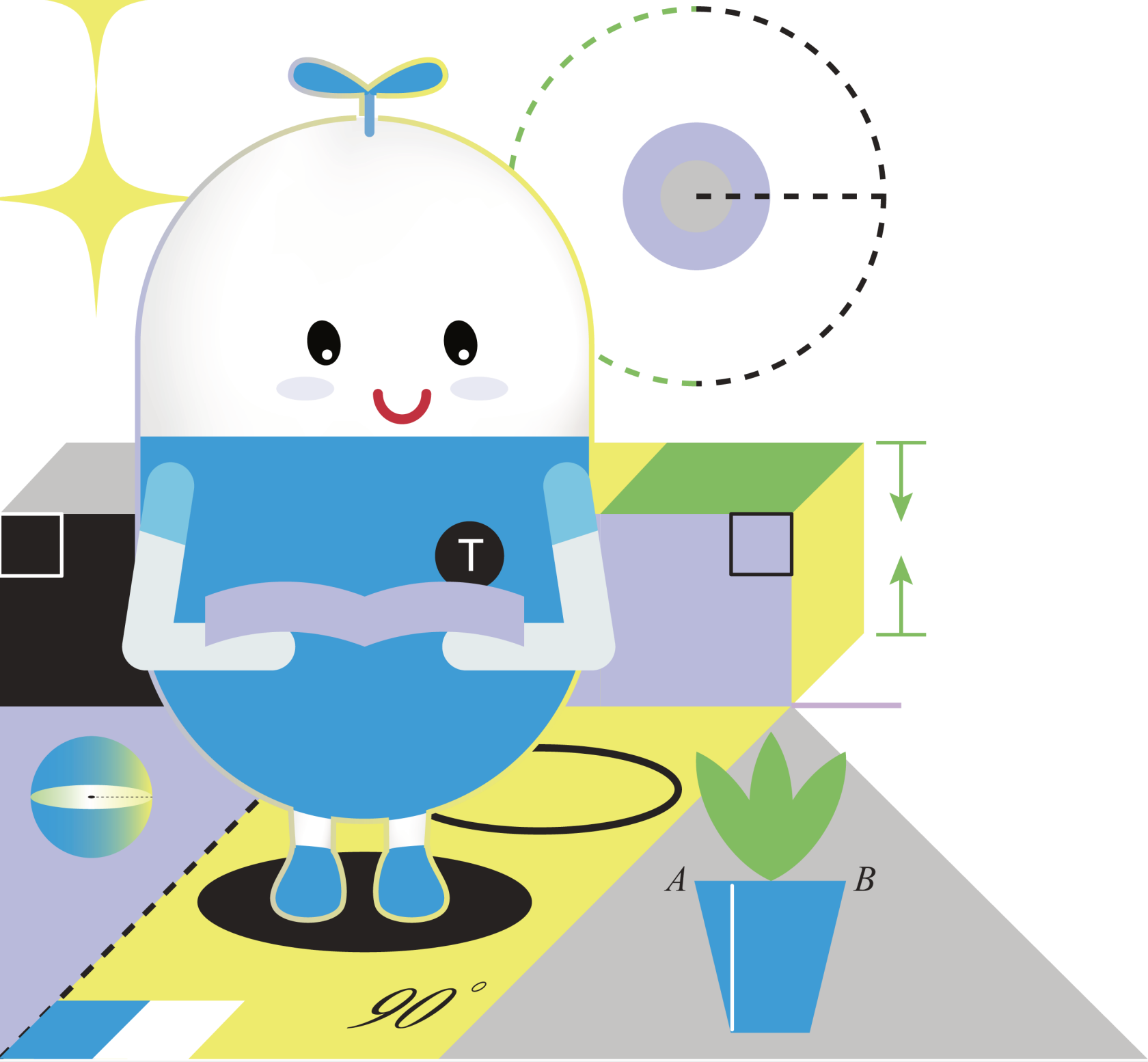
4 Keep Thinking



Think Academy US Online

SCAN ME

https://www.thethinkacademy.com/

CONTENTS

学而思美国ONLINE
小高数学课程体系

Think Academy 小学长期班体系专为K至5年级学生设计，提供专业、系统、全面的全年数学课程，结合北美学生的学习特点与需求，分为**校内和竞赛两大体系，其中**

- 校内体系会根据孩子的数学进度、学习能力划分为：
  - Core+：校内同步，夯实基础，稳步提升
  - Honors：校内超前1年，稳固全A，直通快班
  - Challenge：校内超前1.5-2年，AP满贯，适当拓展

校内体系超前Common Core 1-2 年，对标私校升学考试(MAP、iSEE、SSAT)和公校期中期末考和公校天才班/分班测（STAR Math 、iReady、IOWA，SBA等），确保学生在校内稳固领先。

- 竞赛体系会根据孩子的思维灵活度、新知识点接受度分为：
  - ACE：竞赛奠基，深度拓展，助力5年级AMC8 AR奖项
  - ACE+：竞赛集训队，晋级奥赛，专业数学竞赛路径

竞赛体系则系统覆盖 Math Kangaroo（适合1-4年级）、AMC 8（适合4-8年级）等权威数学竞赛核心知识点，帮助学生全面提升数学思维与竞赛能力，助力校内学习与数学竞赛的双向突破，实现长期领先！

不同班层的开设可以确保不同程度的学生都能找到适合的学习路径。所有班层内容都囊括小学数学七大模块 （计算、几何、数论、应用、计数与概率、代数、组合），但**进度和深度不同**。

	小学									初中		
年级	G3			G4			G5			G6		
学期	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

学而思美国ONLINE
中学竞赛体系学员成绩

2022-2024 AMC8累计获奖学员人数：

456
Achievement Roll
（低年级成就奖）

397
Honor Roll
（全国Top 5%）

134
DHR
（全国Top 1%）

2022-2024 AMC10累计获奖学员人数：

304
AIME晋级
（全国Top 7%）

187
Honor Roll
（全国Top 5%）

45
DHR
（全国Top 1%）

2024 Think全球IMO获奖人数

7金 1银

金牌总数居全球第一

International Mathematical Olympiad
Foundation Bronze Sponsor

Think Academy是国际数学奥林匹克
竞赛官方合作伙伴

Think竞赛课程为什么能培养上千位获奖学员?

1 专业竞赛体系，一站式解决竞赛学习

Think Competition根据美国数学竞赛AMC的考纲设计，贴合学生的考试节奏，在**5-6年级学习AMC8**，**7-8年级学习AMC10**，知识点涵盖竞赛的四大模块：代数，数论，数论，和计数概率，从而每年实现一个竞赛目标，最终帮助中学生**在进入高中前完成AMC10的学习，顺利晋级AIME**。

2 优秀竞赛师资，为好成绩保驾护航

Think Competition课程均由**多年竞赛授课经验**的老师授课，让孩子可以更高效且轻松的掌握复杂竞赛知识点。

James老师
宾大-5年竞赛教龄

Dennis老师
杜克大学-4年竞赛教龄

Yichen老师
哥大-4年竞赛教龄

3 和优秀的同龄人一起学习，共同进步

竞赛体系每年的课程均设置入学考试，确保每位学生可以和水平相近的同龄人一起学习，让竞赛备考不再孤单，孩子们可以互相激励，共同进步。

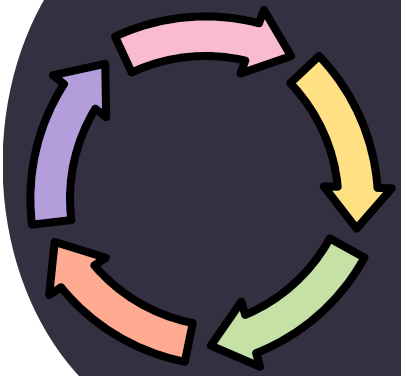
Think Academy US Online

课程亮点

家长省心，规划清晰

授课老师为孩子定制学习规划，全程跟踪学习进度

- **报名课程：**学习规划老师针对孩子的学习能力与目标，**制定个性化学习方案**。
- **上课期间：**每月和家长**反馈孩子的学习情况**，提供有针对性的学习建议，并**监督落实孩子的提升方案**。
- **期中/期末：**每学期组织**家长会**，梳理孩子的学习优势和薄弱环节，并制定新学期的学习规划。



每周学习闭环，保障学习效果

- **课前预习：**15分钟**课前预习题**，温故而知新
- **课后作业：**每节课**配套作业**题目，老师主动和家长反馈学生的作业完成情况。
- **Office Hour：****免费作业讲解直播课**，解答孩子课后不明白的题目与知识点。
- **作业解析：**每道作业配套**讲解视频**，随时复习错题

全年学习服务支持

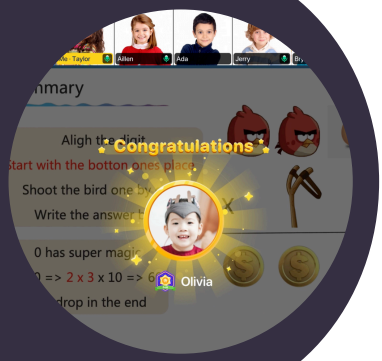
- 专业客服，**全年 364 天 Parent APP 在线支持**，快速响应任何问题
- Parents App**直接和授课老师联系**，沟通更高效，随时掌握孩子的学情表现。
- 在线作业答疑，给孩子**最及时的学习帮助**

课程亮点

孩子开心，学习更高效

精心打磨课堂设计，让孩子爱上数学

- **互动游戏+情景化教学**，让数学课堂不再枯燥
- **金币激励**，孩子可以用金币兑换实体或虚拟奖品，给孩子更及时的正反馈，让孩子更主动地完成学习任务和目标。



自研上课App，强化线上课程体验

- Think Academy**自主研发的上课App**，给孩子带来更丰富的课上互动，包括举手上台，投票作答，选择填空，集体讨论等互动形式，保障**每3分钟一次互动**的频率，提升孩子的上课投入。
- 老师**实时观察每位孩子**的上课情况，保障孩子的学习体验与效果。

成就感带来底层学习动力

- 不仅课上学习高效，课后也有**完善的辅导答疑服务**。课后作业有视频解析，每周还有免费office hour解答孩子的问题，保障每节课都能学懂。
- 孩子在校内达到**成绩和进度双领先**。更愿意投入时间和精力在理科学习上，增强孩子的学习动力，自推成为**理科学霸**。

Topic 1: Multiplying Fraction by Whole Number

(Recommended Learning Time: 4 days)

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

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?

$\frac{3}{23} \times 7 =$ _____

A. $3, 7$ B. $23, 7$ C. $3, 23$

3 Which two numbers should be multiplied first?

$\frac{4}{31} \times 6 =$ _____

A. $4, 6$ B. $31, 6$ C. $4, 31$

4 $\frac{1}{5} \times 7 =$ _____

5 $\frac{2}{5} \times 9 =$ _____

6 $\frac{1}{4} \times 7 =$ _____

7 $\frac{3}{5} \times 12 =$ _____

8 $\frac{2}{9} \times 4 =$ _____

9 $\frac{4}{13} \times 5 =$ _____

10 $\frac{2}{7} \times 3 =$ _____

11 $\frac{7}{4} \times 9 =$ _____

12 $\frac{4}{9} \times 4 =$ _____

13 $\frac{1}{5} \times 8 =$ _____

14 $\frac{7}{13} \times 6 =$ _____

15 $\frac{7}{31} \times 3 =$ _____

16 $\frac{7}{5} \times 15 =$ _____

17 $\frac{8}{7} \times 14 =$ _____

18 $\frac{7}{4} \times 2 =$ _____

19 $\frac{1}{6} \times 72 =$ _____

20 $\frac{4}{27} \times 9 =$ _____

21 $\frac{17}{9} \times 3 =$ _____

22 $\frac{1}{4} \times 4 =$ _____

23 $9 \times \frac{5}{18} =$ _____

24 $4 \times \frac{4}{11} =$ _____

25 $\frac{9}{4} \times 2 =$ _____

26 $\frac{2}{7} \times 14 =$ _____

27 $\frac{1}{3} \times 18 =$ _____

28 $\frac{7}{12} \times 9 =$ _____

29 $\frac{5}{12} \times 2 =$ _____

30 Calculate:

(1) $\frac{5}{12} \times 2 =$ _____

(2) $\frac{7}{13} \times 6 =$ _____

(3) $\frac{7}{31} \times 3 =$ _____

(4) $\frac{13}{10} \times 3 =$ _____

31 Calculate:

(1) $4 \times \frac{7}{3} =$ _____

(2) $5 \times \frac{16}{7} =$ _____

(3) $4 \times \frac{29}{8} =$ _____

(4) $7 \times \frac{9}{7} =$ _____

(5) $6 \times \frac{8}{3} =$ _____

(6) $2 \times \frac{13}{4} =$ _____

32 Calculate:

(1) $5 \times \frac{7}{3} =$ _____

(2) $10 \times \frac{13}{5} =$ _____

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

33 Calculate:

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

(2) $\frac{17}{5} \times 2 =$ _____

(3) $\frac{23}{4} \times 2 =$ _____

(4) $\frac{17}{8} \times 6 =$ _____

34 Calculate:

(1) $\frac{3}{8} \times 40 =$ _____

(2) $18 \times \frac{5}{9} =$ _____

(3) $\frac{8}{35} \times 7 =$ _____

(4) $\frac{5}{21} \times 15 =$ _____

(5) $\frac{8}{49} \times 7 =$ _____

(6) $12 \times \frac{5}{8} =$ _____

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:

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

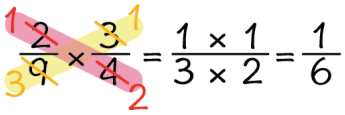
(2) Calculate $\frac{2}{9} \times \frac{3}{4}$

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.



$$= \frac{1 \times 1}{3 \times 2} = \frac{1}{6}$$

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

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

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

3 $\frac{3}{13} \times \frac{5}{4} =$ _____

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) $\frac{3}{5} \times \frac{1}{2} =$ _____

(2) $\frac{7}{17} \times \frac{2}{3} =$ _____

6 Calculate:

(1) $\frac{7}{9} \times \frac{14}{3} =$ _____

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

7 Calculate:

(1) $\frac{1}{5} \times \frac{1}{6} =$ _____

(2) $\frac{5}{2} \times \frac{7}{13} =$ _____

(3) $\frac{10}{3} \times \frac{5}{21} =$ _____

(4) $\frac{2}{9} \times \frac{14}{3} =$ _____

(5) $\frac{7}{3} \times \frac{7}{10} =$ _____

(6) $\frac{2}{9} \times \frac{4}{3} =$ _____

8 Calculate:

(1) $\frac{5}{6} \times \frac{1}{2} =$ _____

(2) $\frac{11}{10} \times \frac{7}{9} =$ _____

(3) $\frac{5}{18} \times \frac{5}{2} =$ _____

(4) $\frac{5}{11} \times \frac{6}{7} =$ _____

9 $\frac{2}{5} \times \frac{11}{13} =$ _____

10 Calculate:

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

(2) $\frac{2}{11} \times \frac{5}{3} =$ _____

11 Calculate:

(1) $\frac{5}{8} \times \frac{7}{9} =$ _____

(2) $\frac{3}{4} \times \frac{9}{7} =$ _____

(3) $\frac{61}{2} \times \frac{1}{37} =$ _____

(4) $\frac{15}{14} \times \frac{3}{8} =$ _____

12 Calculate:

(1) $\frac{3}{8} \times \frac{7}{10} =$ _____

(2) $\frac{13}{2} \times \frac{1}{7} =$ _____

(3) $\frac{15}{2} \times \frac{1}{37} =$ _____

(4) $\frac{3}{4} \times \frac{7}{25} =$ _____

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

(1) $\frac{9}{25} \times \frac{25}{18} = \frac{9 \times 25}{25 \times 18} =$ _____

(2) $\frac{7}{12} \times \frac{3}{14} = \frac{7 \times 3}{12 \times 14} =$ _____

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

15 Simplify before finding the product.

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

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

16 $\frac{24}{31} \times \frac{31}{8} = \frac{(\ ) \times (\ )}{(\ ) \times (\ )} =$ _____

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

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

→ 5 is a prime number. Stop here!

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

Prime factorization of 60:

$\boxed{60 = 2^2 \times 3 \times 5}$

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 _____ .

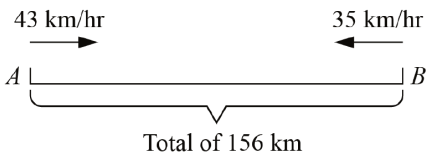
13 The product of three even numbers is 168. What are these three even numbers?

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 km per hour

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

$T = D \div V_{sum} = 156 \div 78 = 2$ 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?

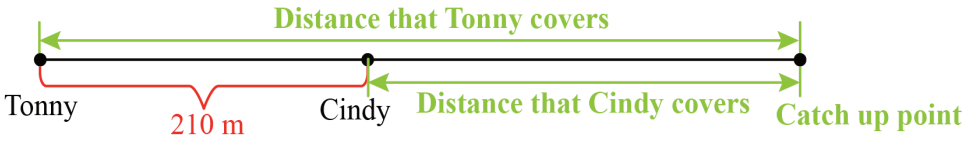
(4) How long will it take them to be 10 kilometers away from each other for the second time?

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:

$75 - 45 = 30$ m/min

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

Therefore:

$T = D_{difference} \div V_{difference} = 210 \div 30 = 7$ 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?

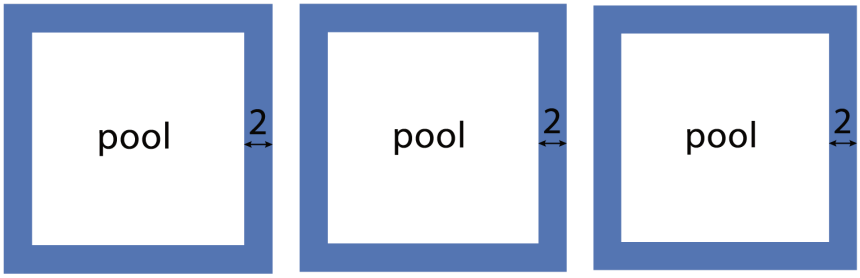
9 Aiden is biking home from school at a speed of 80 meters per minute. His younger brother Henry bikes off school at 200 meters per minute 12 minutes after Aiden's departure. Assume their speeds are unchanged. When will Henry catch up with Aiden?

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

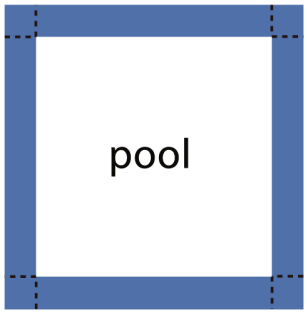
(Recommended Learning Time: 3 days)

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: $2 \times 2 \times 4 = 16$ m^2.

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

Area of the road: $104 + 16 = 120$ m^2.

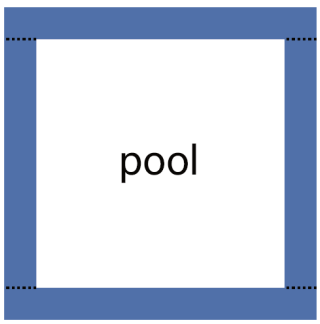
Method 2:

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

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

Method 3:

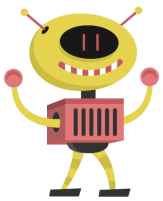
Divide this road into four rectangles as shown below, with two of them having a length of 13 + 2 + 2 = 17 and a width of 2, and another two of them having a length of 13 and a width is 2.



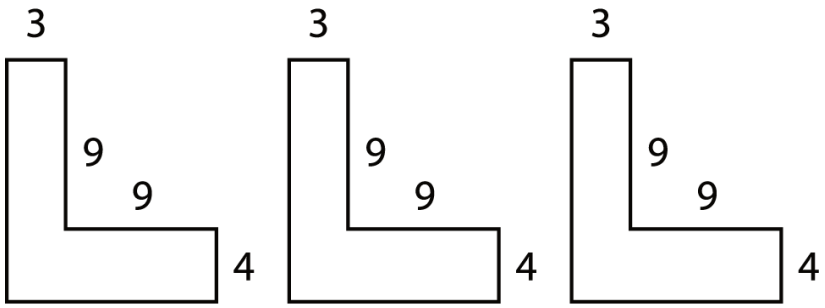
Area of the road: $17 \times 2 \times 2 + 13 \times 2 \times 2 = 120$ m^2.

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

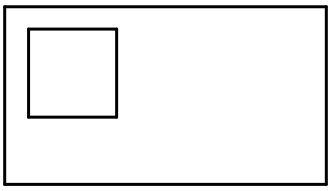
2



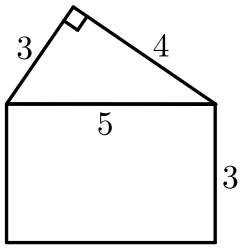
Can you use more than one way to find the area of the irregular shape below ?



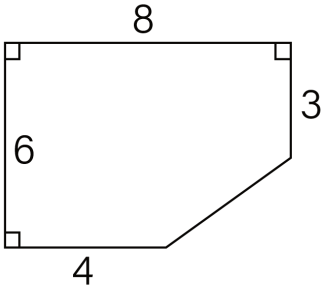
3 As shown in the figure below, cut off a small square with the side length of 6 from the rectangle, where the length is 20 and the width is 12. Find the area of the remaining figure.



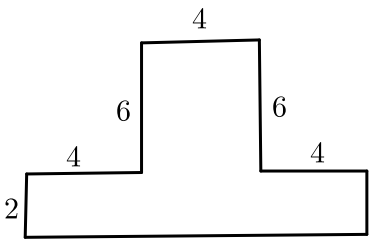
4 The figure below consists of a rectangle and a right triangle. Find the area of the entire figure.



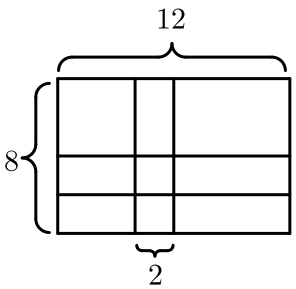
5 Find the area of the pentagon below. (Unit: centimeters)



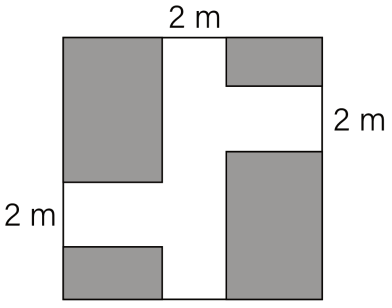
6 Find the perimeter and area of the figure below, respectively.



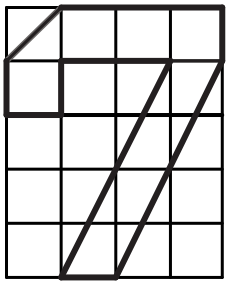
7 As shown in the figure below, there are two stone pathways in a rectangular flowerbed, which are both 2 meters wide and perpendicular to each other. The length of flowerbed is 12 m and the width is 8 m. Find the area where flowers can be grown.



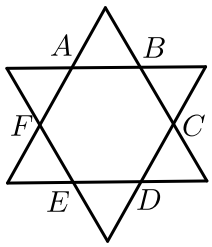
8 As shown in the figure below, there is a square lawn with the side length of 8 m. Bob is building a pathway with the width of 2 m, which is shown as the blank region. Find the area of the shaded region.



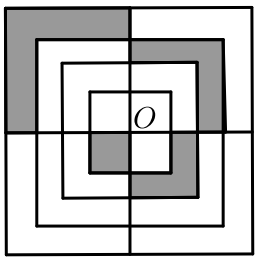
9 As shown in the grid below, the area of each square is 1. Find the area of the figure in the grid.



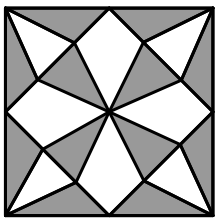
10 The area of regular hexagon $ABCDEF$ is 1 m^2. Extend each side of hexagon from each vertex for its length to form the figure below. Find the area of the figure.



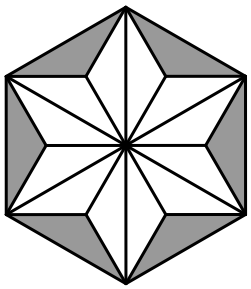
11 As shown in the figure below, point O is the center of the four squares, where the side lengths are 4, 6, 8, and 10, respectively. Find the area of the shaded region.



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.



Answers

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. (1) $\frac{5}{12}$
   (2) $\frac{77}{90}$
   (3) $\frac{25}{36}$
   (4) $\frac{30}{77}$
9. $\frac{22}{65}$
10. (1) $\frac{3}{20}$
    (2) $\frac{10}{33}$
11. (1) $\frac{35}{72}$
    (2) $\frac{27}{28}$
    (3) $\frac{61}{74}$
    (4) $\frac{45}{112}$
12. (1) $\frac{21}{80}$
    (2) $\frac{13}{14}$
    (3) $\frac{15}{74}$
    (4) $\frac{21}{100}$
13. (1) $\frac{1}{2}$
    (2) $\frac{1}{8}$
14. $\frac{6}{7} \times \frac{2}{3} = \frac{2 \times 2}{7 \times 1} = \frac{4}{7}$
15. (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. $\frac{24}{31} \times \frac{31}{8} = \frac{3 \times 1}{1 \times 1} = 3$

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

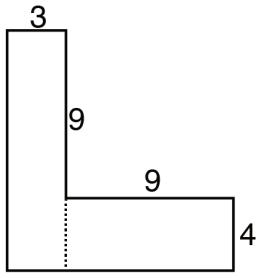
(Recommended Learning Time: 3 days)

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

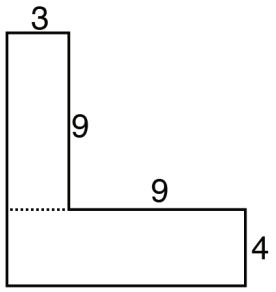
(Recommended Learning Time: 3 days)

1. N/A
2. Method 1:



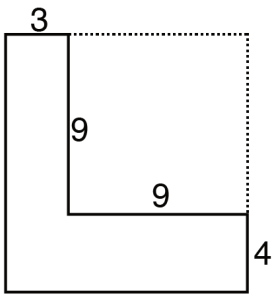
$3 \times (9 + 4) + 9 \times 4 = 75$

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

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