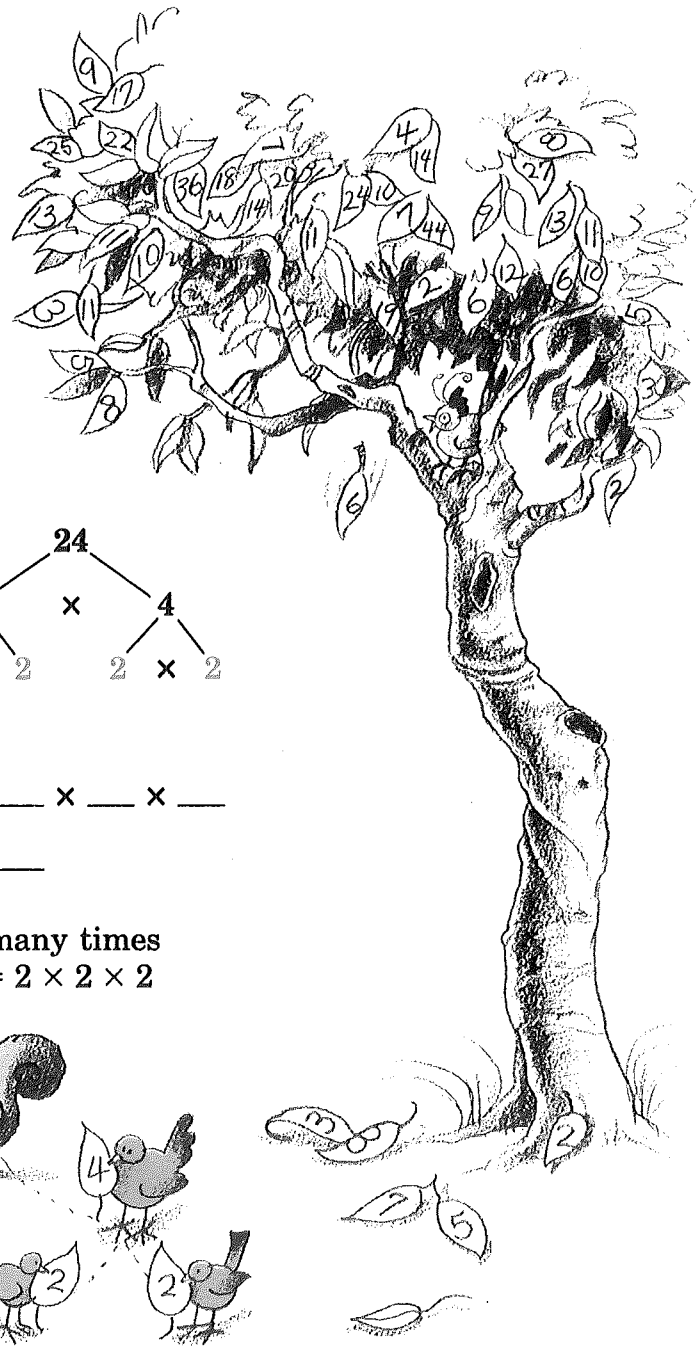
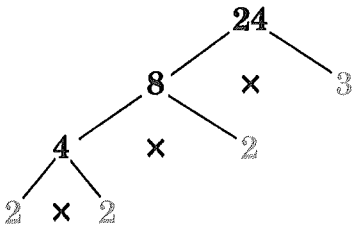
Prime Factoring

Any whole number greater than 1 can be written as a product of prime number factors. This is called **prime factoring.** One way to find prime number factors is to make a **factor tree.** There may be different ways to start a factor tree, but the final set of prime factors will always be the same. Use a factor tree to find the prime factors of 24. Use exponents to write this prime factorization.





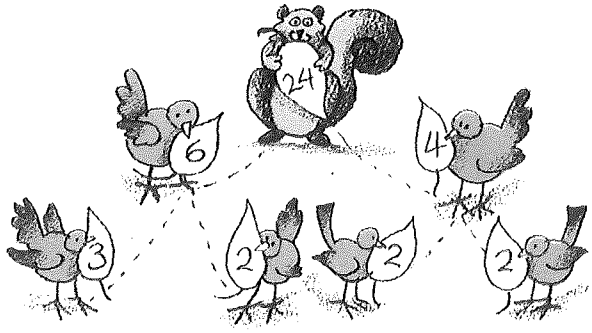
$2 \times 2 \times 2 \times 3$

$2^3 \times 3$

___ × ___ × ___ × ___

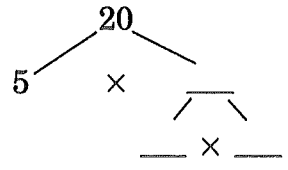
___ × ___

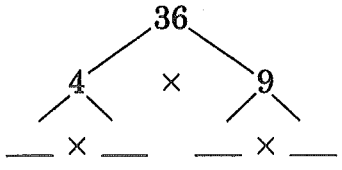
✔ Remember, the exponent tells how many times to use the base number as a factor. $2^3 = 2 \times 2 \times 2$

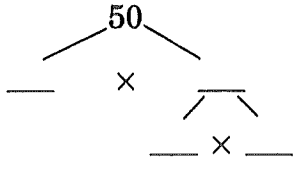


Getting Started

Complete each factor tree.

1. 

2. 

3. 

Write each prime factorization using exponents if possible.

4. 8 _____

5. 35 _____

6. 48 _____

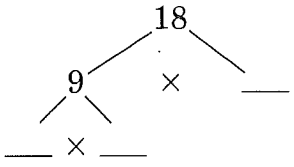
7. 72 _____

8. 400 _____

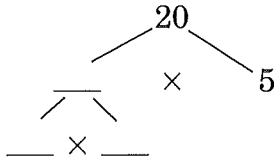
Practice

Complete each factor tree.

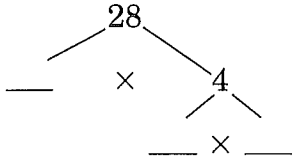
1.



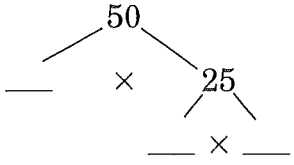
2.



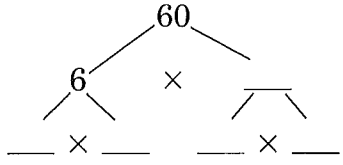
3.



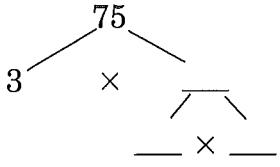
4.



5.



6.



Write each prime factorization using exponents if possible.

7. 10 _____

8. 28 _____

9. 55 _____

10. 64 _____

11. 66 _____

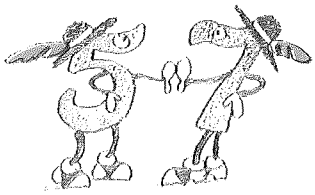
12. 84 _____

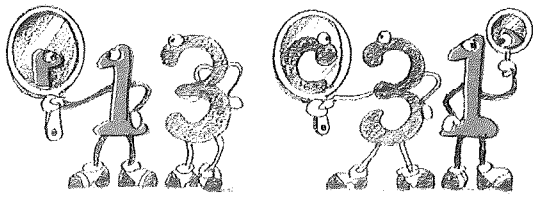
13. 100 _____

14. 125 _____

15. 180 _____

16. 225 _____





EXCURSION

1. Primes that differ by 2 are called **twin primes.** 5 and 7 are examples of twin primes. List all the twin primes less than 100.

   _____

2. Primes that have digits that are reversed are called **mirror primes.** 13 and 31 are mirror primes. List all the mirror primes less than 100.

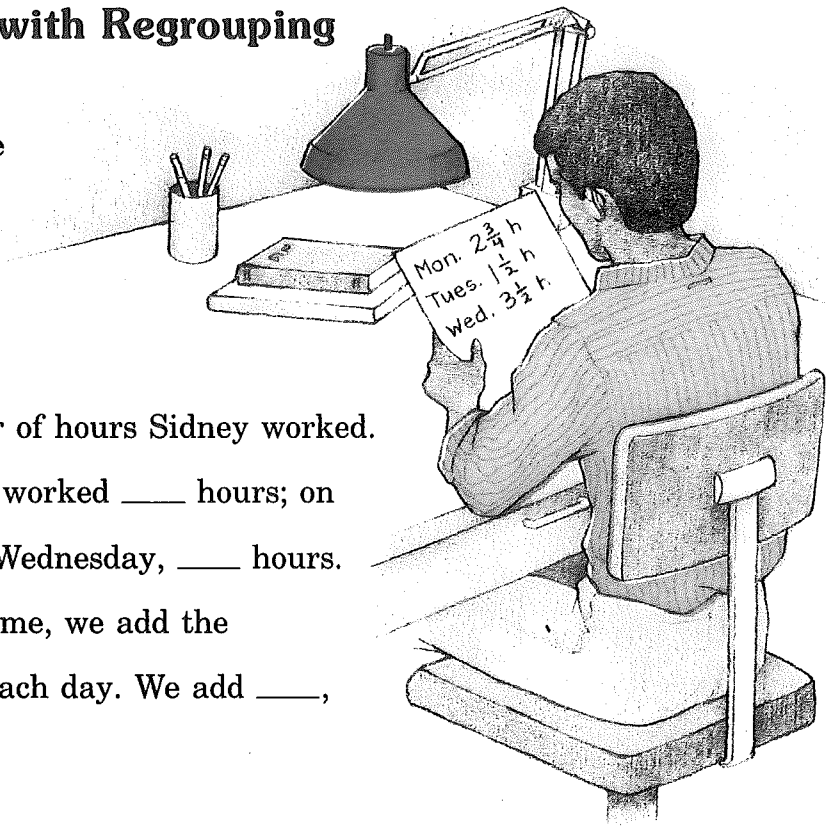
   _____

3. A **perfect number** is a number that is the sum of all of its factors except itself. $6 = 1 + 2 + 3$, therefore 6 is a perfect number. List all of the perfect numbers less than 50.

   _____

Adding Mixed Numbers with Regrouping

Sidney's goal is to improve his study habits. He kept track of the time he spent on homework last week. How many hours did he spend on his homework?



We want to know the number of hours Sidney worked.

We know that on Monday he worked ____ hours; on Tuesday, ____ hours; and on Wednesday, ____ hours.

To find his total homework time, we add the number of hours he worked each day. We add ____, ____ and ____.

Rename the fractions as equivalent fractions with the least common denominator.	Add the fractions.	Add the whole numbers.	Simplify the answer.
$2\frac{3}{4} = 2\frac{3}{4}$	$2\frac{3}{4}$	$2\frac{3}{4}$	$\frac{7}{4} = 1\frac{3}{4}$
$1\frac{1}{2} = 1\frac{2}{4}$	$1\frac{2}{4}$	$1\frac{2}{4}$	$6\frac{7}{4} = 6 + 1\frac{3}{4} = 7\frac{3}{4}$
$+ 3\frac{1}{2} = 3\frac{2}{4}$	$+ 3\frac{2}{4}$	$+ 3\frac{2}{4}$	
	$\frac{7}{4}$	$6\frac{7}{4}$	

Sidney spent ____ hours on his homework.

Getting Started

Add. Simplify answers if necessary.

1. $3\frac{2}{3} + 4\frac{1}{3}$

2. $5\frac{3}{5} + 6\frac{2}{3}$

3. $3\frac{1}{2} + 4\frac{2}{3} + 5\frac{1}{4}$

4. $9\frac{2}{3} + 6\frac{3}{4} + 5\frac{1}{6}$

Copy and add.

5. $3\frac{4}{5} + 8\frac{2}{3}$

6. $7\frac{5}{6} + 15\frac{3}{8}$

7. $25\frac{1}{2} + 29\frac{3}{5} + 52\frac{3}{4}$

Practice

Add. Simplify answers if necessary.

1. $4\frac{1}{2} + 5\frac{1}{3}$

2. $5\frac{3}{4} + 7\frac{1}{4}$

3. $6\frac{3}{4} + 4\frac{5}{8}$

4. $8\frac{2}{3} + 6\frac{5}{8}$

5. $17\frac{5}{8} + 15\frac{5}{6} + 4\frac{3}{4}$

6. $21\frac{2}{3} + 8\frac{1}{2} + 5\frac{5}{6}$

7. $26\frac{3}{8} + 14\frac{5}{6} + 23\frac{3}{4}$

8. $18\frac{7}{8} + 46\frac{5}{6} + 38\frac{3}{4}$

Copy and Do

9. $7\frac{5}{8} + 9\frac{3}{4}$

10. $6\frac{7}{12} + 9\frac{5}{6}$

11. $8\frac{2}{3} + 9\frac{1}{2}$

12. $9\frac{7}{12} + 8\frac{5}{8}$

13. $8\frac{3}{8} + 5\frac{2}{3}$

14. $11\frac{9}{16} + 12\frac{7}{8}$

15. $25\frac{7}{9} + 18\frac{11}{12}$

16. $27\frac{2}{5} + 14\frac{2}{3}$

17. $21\frac{6}{7} + 83\frac{4}{5}$

18. $9\frac{1}{6} + 5\frac{3}{4} + 8\frac{1}{2}$

19. $12\frac{2}{3} + 8\frac{3}{4} + 9\frac{1}{6}$

20. $42\frac{1}{2} + 29\frac{5}{8} + 47\frac{5}{6}$

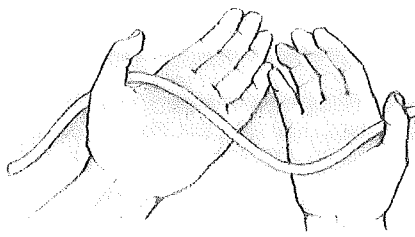
Apply

Solve these problems.

21. The world's longest piece of spaghetti was $2\frac{3}{4}$ feet. Mr. O'Malley made a piece of spaghetti $3\frac{1}{2}$ feet longer. How long is the new spaghetti?

22. A recipe for whole grain bread uses $3\frac{3}{5}$ cups of wheat flour and $2\frac{3}{4}$ cups of rye flour. How much flour is used in the recipe?

23. A railroad crew repaired $3\frac{1}{4}$ miles of track on Monday, $5\frac{2}{3}$ miles on Wednesday and $2\frac{5}{6}$ miles on Friday. How many miles of track did the crew repair during the week?



24. Mr. Peterson fills his car with gasoline each Monday. How many gallons of gasoline did he buy in December?

Monday, December 6	$11\frac{3}{10}$ gallons
Monday, December 13	$10\frac{2}{5}$ gallons
Monday, December 20	$12\frac{7}{10}$ gallons
Monday, December 27	$11\frac{3}{5}$ gallons

Subtracting Mixed Numbers with Regrouping

Chuck is cutting ribbons to make award badges. How much ribbon will be left after he cuts a $3\frac{5}{6}$-inch strip?

We want to know how much ribbon will be left.

We know the ribbon is ____ inches long, and Chuck needs a strip ____ inches long.

To find the amount left, we subtract the length he cuts from the length he started with. We subtract ____ from ____.

Rename the fractions as equivalent fractions with the least common denominator.	Regroup the minuend.	Subtract.
$5\frac{1}{4} = 5\frac{3}{12}$	$5\frac{1}{4} = 5\frac{3}{12} = 4\frac{15}{12}$	$5\frac{1}{4} = 5\frac{3}{12} = 4\frac{15}{12}$
$-\ 3\frac{5}{6} = 3\frac{10}{12}$	$-\ 3\frac{5}{6} = 3\frac{10}{12} = 3\frac{10}{12}$	$-\ 3\frac{5}{6} = 3\frac{10}{12} = 3\frac{10}{12}$
		$1\frac{5}{12}$

Chuck will have ____ inches of ribbon left.

Getting Started

Subtract.

1. $7\frac{1}{3} - 4\frac{1}{2}$

2. $8\frac{3}{8} - 3\frac{5}{6}$

3. $12\frac{1}{9} - 6\frac{2}{3}$

4. $26\frac{1}{8} - 18\frac{5}{12}$

5. $58\frac{3}{4} - 23\frac{5}{6}$

6. $436\frac{3}{5} - 189\frac{7}{10}$

Copy and subtract.

7. $9\frac{1}{5} - 2\frac{7}{10}$

8. $60\frac{3}{8} - 27\frac{9}{10}$

9. $703\frac{2}{9} - 677\frac{5}{6}$

Practice

Rename each fraction.

1. $6\frac{3}{4} = 5\frac{\quad}{4}$
2. $9\frac{2}{3} = 8\frac{\quad}{3}$
3. $5\frac{5}{9} = 4\frac{\quad}{9}$
4. $6 = 5\frac{\quad}{6}$
5. $7\frac{5}{8} = 6\frac{\quad}{8}$
6. $4\frac{5}{12} = 3\frac{\quad}{12}$
7. $12\frac{5}{7} = 11\frac{\quad}{7}$
8. $1\frac{3}{5} = \frac{\quad}{5}$

Subtract.

9. $9\frac{1}{4} - 7\frac{3}{4}$
10. $8 - 5\frac{7}{10}$
11. $16\frac{3}{8} - 9\frac{5}{8}$
12. $25\frac{2}{5} - 18\frac{3}{5}$
13. $23\frac{1}{3} - 16\frac{2}{3}$
14. $86\frac{5}{11} - 49\frac{7}{11}$
15. $128\frac{1}{16} - 92\frac{13}{16}$
16. $309\frac{1}{12} - 153\frac{11}{12}$

Apply

Solve these problems.

17. At the track meet, Alexa jumped $14\frac{1}{4}$ feet. Marlene jumped $11\frac{3}{4}$ feet. How much farther than Marlene did Alexa jump?

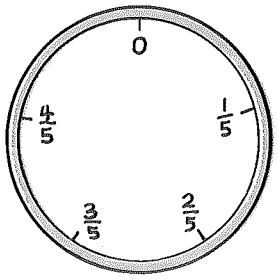
18. Dex wants to collect 100 pounds of aluminum cans. He has made two collection trips. On the first trip he collected $36\frac{3}{8}$ pounds and on the second, he collected $42\frac{5}{8}$ pounds. How many more pounds of aluminum cans does he need to reach his goal?

EXCURSION

Study fraction addition on the clock. Complete the addition table using the clock to help find the sums.

$$\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$$
$$\frac{3}{5} + \frac{4}{5} = \frac{2}{5}$$
$$\frac{2}{5} + \frac{3}{5} = 0$$

+	0	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$
0					
$\frac{1}{5}$					
$\frac{2}{5}$					
$\frac{3}{5}$					
$\frac{4}{5}$					



Adding and Subtracting Fractions

Add or subtract. Simplify answers if necessary.

1. $3\frac{1}{4} + 4\frac{1}{4}$

2. $8\frac{3}{7} + 9\frac{5}{7}$

3. $7\frac{7}{12} - 5\frac{1}{12}$

4. $8 - 2\frac{3}{5}$

5. $12\frac{2}{3} + 6\frac{1}{2}$

6. $18\frac{3}{5} - 11\frac{1}{4}$

7. $62\frac{1}{3} - 48\frac{2}{3}$

8. $79\frac{3}{4} + 26\frac{5}{6}$

9. $61\frac{1}{5} - 14\frac{3}{10}$

10. $53\frac{2}{3} - 18\frac{5}{7}$

11. $96\frac{1}{8} - 48\frac{5}{6}$

12. $43\frac{5}{9} - 16\frac{5}{6}$

13. $465\frac{1}{2} - 183\frac{3}{5}$

14. $803\frac{1}{12} - 675\frac{5}{8}$

15. $721\frac{4}{15} - 239\frac{7}{10}$

16. $915\frac{2}{3} - 625\frac{7}{15}$

17. $816\frac{3}{10} - 177\frac{5}{8}$

18. $279\frac{7}{9} - 158\frac{4}{5}$

19. $106\frac{3}{8} - 97\frac{2}{3}$

20. $540\frac{2}{3} - 215\frac{6}{7}$

Copy and Do

21. $\frac{3}{4} + \frac{2}{3} + \frac{1}{6}$

22. $\frac{1}{2} + \frac{5}{9} + \frac{2}{3}$

23. $\frac{1}{5} + \frac{3}{10} + \frac{7}{15}$

24. $\frac{9}{16} - \frac{1}{6}$

25. $\frac{4}{7} - \frac{2}{5}$

26. $\frac{7}{12} - \frac{3}{16}$

27. $5\frac{2}{3} - 4\frac{3}{5}$

28. $8\frac{7}{8} - 7\frac{1}{6}$

29. $14\frac{1}{3} - 9\frac{4}{5}$

30. $8\frac{1}{2} + 12\frac{5}{8}$

31. $16\frac{2}{9} - \frac{5}{6}$

32. $6\frac{9}{10} + 7\frac{3}{5}$

33. $25\frac{1}{8} - 16\frac{1}{2}$

34. $34\frac{2}{3} - 16\frac{1}{5}$

35. $47\frac{5}{8} + 87\frac{9}{16}$

36. $26\frac{3}{7} + 96\frac{7}{9}$

37. $57\frac{7}{8} - 42\frac{3}{16}$

38. $94 - 87\frac{7}{12}$

39. $124\frac{2}{5} - 86\frac{7}{10}$

40. $836\frac{5}{6} - 429\frac{2}{3}$

41. $415\frac{7}{8} + 329\frac{5}{8}$

42. $607\frac{1}{3} - 498\frac{1}{2}$

43. $943\frac{5}{7} - 485\frac{5}{7}$

44. $821\frac{3}{5} + 468\frac{9}{25}$

Apply

Use information from the charts to solve these problems.

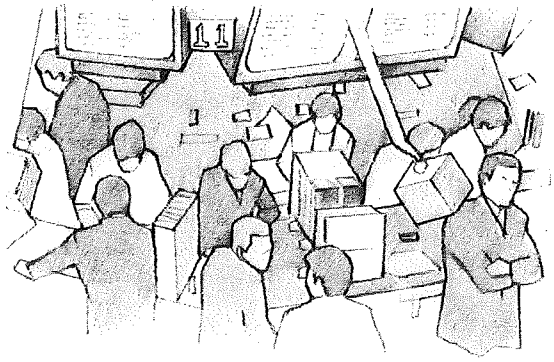
Speed in Miles per Hour (MPH)	Miles per Gallon (MPG)
35	24
45	$20\frac{1}{4}$
55	$18\frac{1}{3}$
65	$15\frac{1}{5}$

1. How does the MPG change when the speed is reduced from 45 MPH to 35 MPH?

2. How does the MPG change when the speed is reduced from 65 MPH to 55 MPH?

3. How does the MPG change when the speed is increased from 35 MPH to 65 MPH?

Name of Stock	Yearly High	Yearly Low	Change
ACT	$42\frac{1}{2}$	$36\frac{5}{8}$	?
RPJ	$106\frac{1}{4}$	?	$8\frac{1}{2}$
DCM	$77\frac{3}{8}$	?	$10\frac{3}{4}$
STV	?	$88\frac{7}{8}$	$4\frac{1}{2}$



4. What is the change in ACT stock?

5. What is the yearly low for RPJ stock?

6. What is the yearly low for DCM stock?

7. What is the yearly high for STV stock?

8. How much more did RPJ stock change than STV stock?

9. What is the combined yearly high for both DCM and RPJ stock?

Cases Packed	
Ron	$12\frac{1}{3}$ cases
Al	$9\frac{1}{5}$ cases
Rich	$15\frac{3}{4}$ cases

10. How many cases in all did the boys pack?

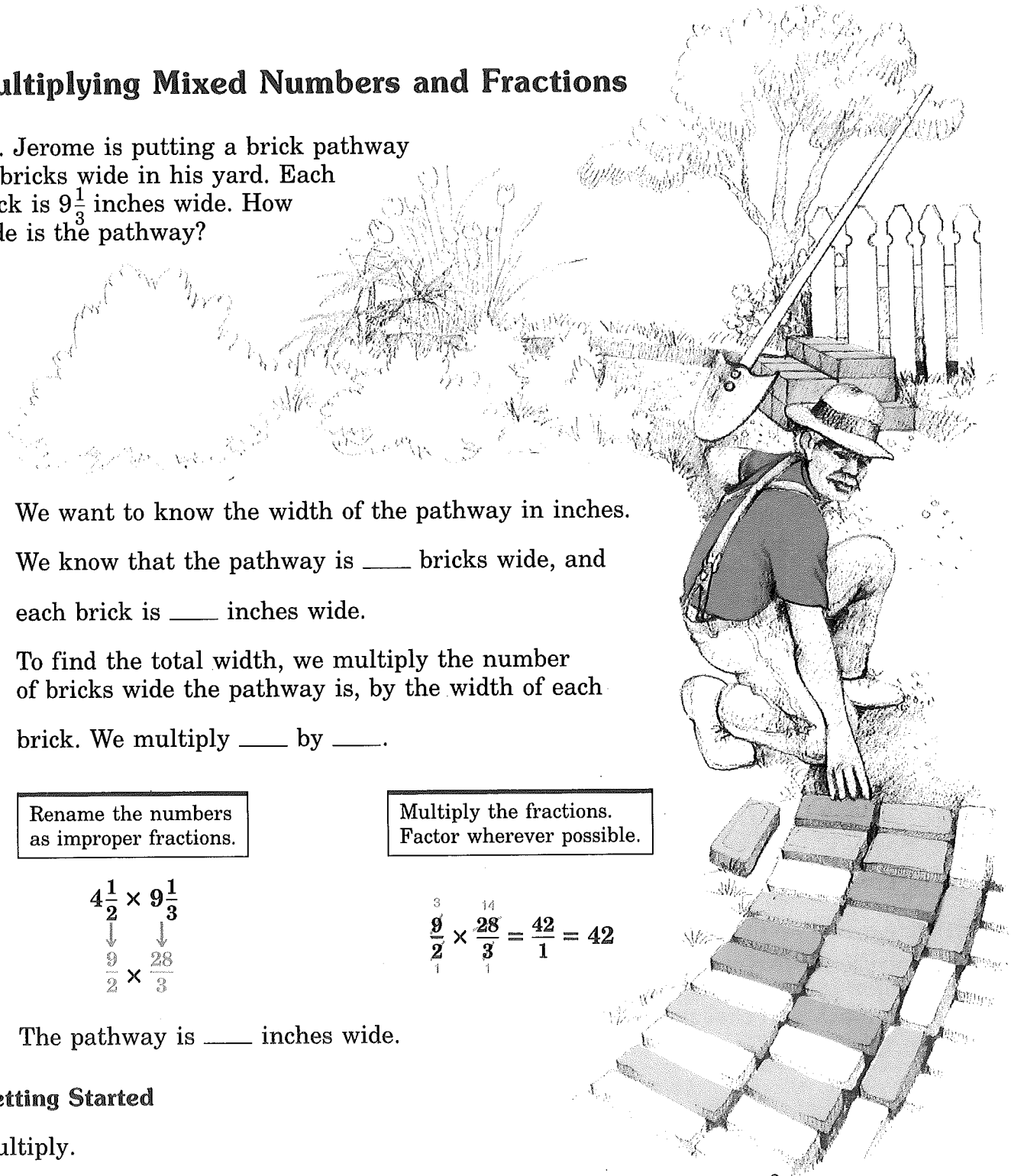
11. How many more cases did Rich pack than Al?

12. How many more cases did Al and Rich pack together than Ron?

13. How many more cases did Rich pack than Ron?

Multiplying Mixed Numbers and Fractions

Mr. Jerome is putting a brick pathway $4\frac{1}{2}$ bricks wide in his yard. Each brick is $9\frac{1}{3}$ inches wide. How wide is the pathway?



We want to know the width of the pathway in inches.

We know that the pathway is ____ bricks wide, and each brick is ____ inches wide.

To find the total width, we multiply the number of bricks wide the pathway is, by the width of each brick. We multiply ____ by ____.

Rename the numbers as improper fractions.

$$4\frac{1}{2} \times 9\frac{1}{3}$$
$$\downarrow \quad \downarrow$$
$$\frac{9}{2} \times \frac{28}{3}$$

Multiply the fractions. Factor wherever possible.

$$\frac{\overset{3}{\cancel{9}}}{\underset{1}{\cancel{2}}} \times \frac{\overset{14}{\cancel{28}}}{\underset{1}{\cancel{3}}} = \frac{42}{1} = 42$$

The pathway is ____ inches wide.

Getting Started

Multiply.

1. $\frac{3}{4} \times 3\frac{1}{5} =$ ____
2. $6\frac{1}{4} \times \frac{3}{5} =$ ____
3. $24 \times \frac{2}{3} =$ ____
4. $2\frac{5}{8} \times 1\frac{1}{7} =$ ____
5. $\frac{4}{5} \times 100 =$ ____
6. $5\frac{1}{3} \times 5\frac{1}{4} =$ ____
7. $\frac{3}{8} \times 2\frac{2}{3} \times 93 =$ ____
8. $1\frac{1}{2} \times 5\frac{1}{3} \times 1\frac{1}{8} =$ ____
9. $3\frac{1}{8} \times 6\frac{2}{3} \times 24 =$ ____

Copy and multiply.

10. $\frac{2}{3} \times 150$
11. $4 \times 5\frac{5}{6} \times 3$
12. $2\frac{1}{2} \times 3\frac{1}{3} \times 4\frac{1}{8}$

Practice

Multiply.

1. $\frac{5}{6} \times 1\frac{1}{10} =$ ____
2. $4\frac{1}{5} \times \frac{3}{7} =$ ____
3. $\frac{5}{8} \times 64 =$ ____
4. $3\frac{1}{3} \times 1\frac{1}{5} =$ ____
5. $6\frac{1}{4} \times 2\frac{2}{5} =$ ____
6. $9\frac{1}{3} \times 2\frac{1}{4} =$ ____
7. $7\frac{1}{3} \times 2\frac{5}{6} =$ ____
8. $3\frac{1}{8} \times 1\frac{3}{10} =$ ____
9. $3\frac{7}{10} \times 4\frac{1}{6} =$ ____
10. $6\frac{2}{3} \times 4\frac{3}{8} =$ ____
11. $15\frac{3}{4} \times 2\frac{4}{7} =$ ____
12. $2\frac{7}{9} \times 2\frac{7}{10} =$ ____
13. $9\frac{3}{8} \times 5\frac{1}{5} =$ ____
14. $6\frac{3}{10} \times 2\frac{1}{9} =$ ____
15. $3\frac{2}{3} \times \frac{3}{22} =$ ____

Copy and Do

16. $\frac{4}{9} \times 450$
17. $5\frac{1}{4} \times 2\frac{2}{7}$
18. $1\frac{3}{5} \times \frac{10}{11}$
19. $2\frac{1}{4} \times 9\frac{1}{3}$
20. $2\frac{2}{5} \times 2\frac{1}{2}$
21. $6\frac{2}{3} \times 2\frac{5}{8}$
22. $\frac{2}{3} \times 12 \times 2\frac{1}{4}$
23. $3\frac{1}{3} \times 1\frac{1}{8} \times 2\frac{2}{5}$
24. $1\frac{1}{5} \times \frac{7}{10} \times 2\frac{1}{12}$
25. $1\frac{1}{14} \times 1\frac{1}{2} \times 2\frac{2}{3}$
26. $\frac{3}{4} \times 1\frac{7}{9} \times \frac{3}{4}$
27. $6 \times 2\frac{1}{12} \times 8$
28. $1\frac{2}{5} \times 1\frac{5}{28} \times 3\frac{3}{4}$
29. $7\frac{1}{9} \times 1\frac{15}{16} \times \frac{3}{7}$
30. $3\frac{3}{5} \times 1\frac{1}{3} \times 1\frac{7}{8}$

Apply

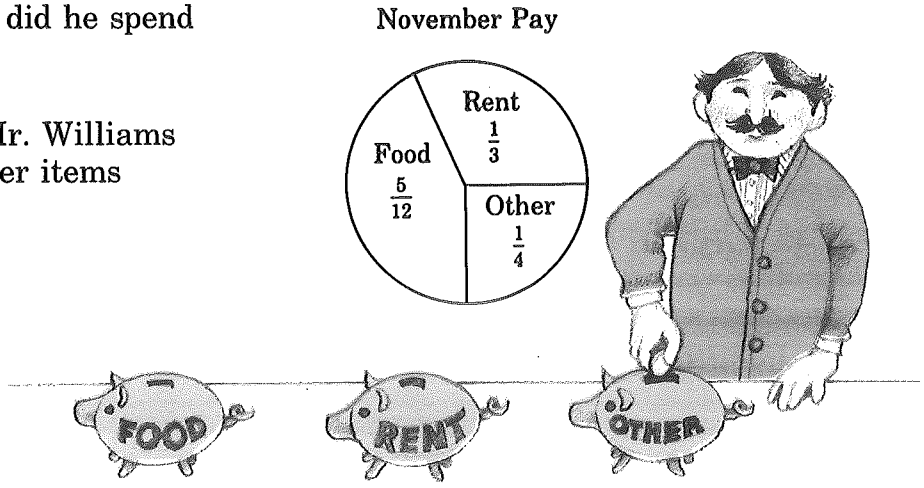
Solve these problems.

31. The gravity on the moon is $\frac{1}{6}$ of the gravity on the earth. If a person weighs 180 pounds on the earth, how much will that person weigh on the moon?

32. A recipe calls for $2\frac{3}{4}$ cups of white flour and $3\frac{1}{2}$ cups of whole wheat flour. How much flour will be needed to make the recipe $1\frac{3}{5}$ times larger?

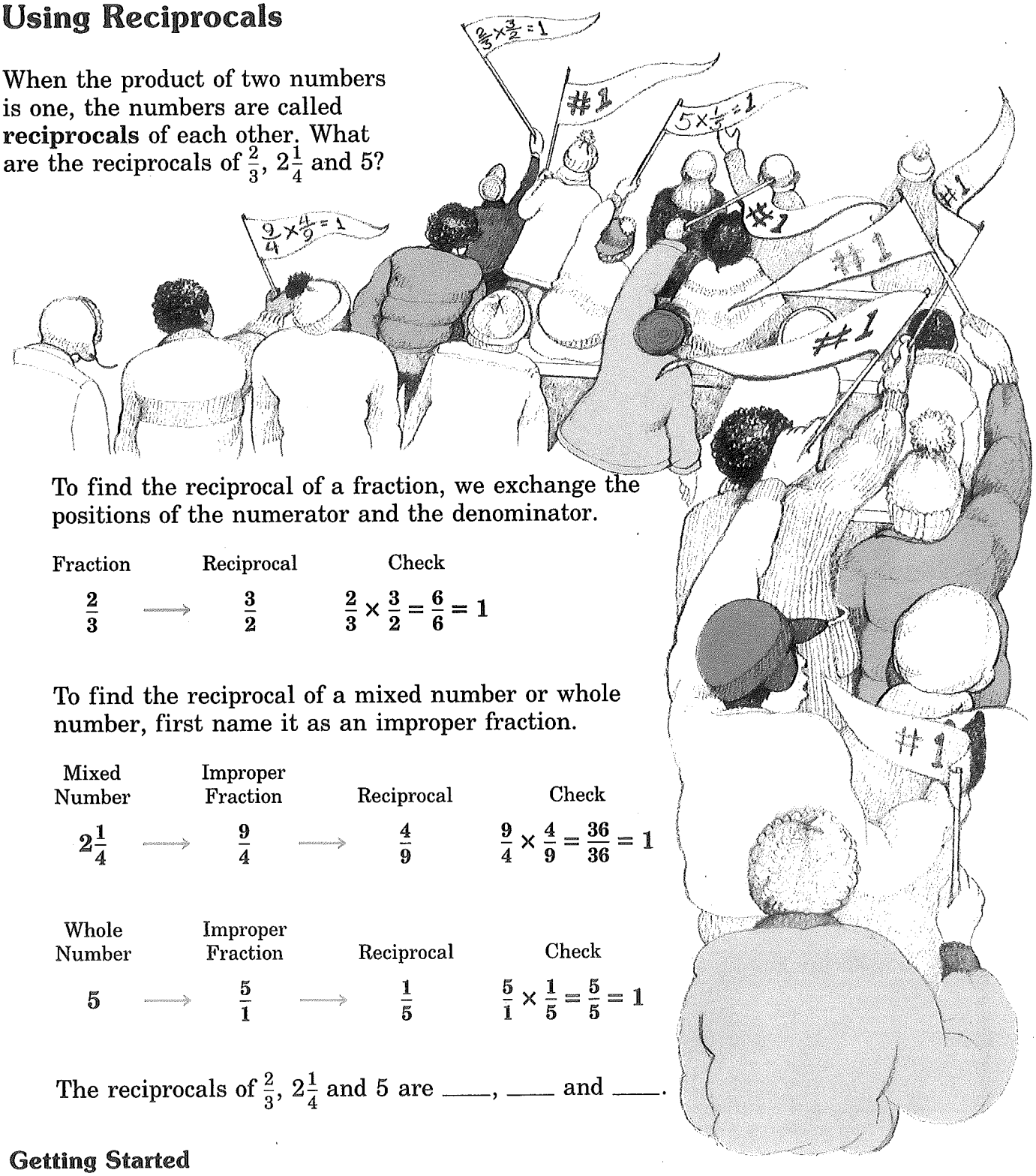
33. Mr. Williams earned $2,844 in November. How much did he spend on food and rent?

34. How much more did Mr. Williams spend for rent and other items than on food?



Using Reciprocals

When the product of two numbers is one, the numbers are called **reciprocals** of each other. What are the reciprocals of $\frac{2}{3}$, $2\frac{1}{4}$ and 5?



To find the reciprocal of a fraction, we exchange the positions of the numerator and the denominator.

Fraction		Reciprocal	Check
$\frac{2}{3}$	$\longrightarrow$	$\frac{3}{2}$	$\frac{2}{3} \times \frac{3}{2} = \frac{6}{6} = 1$

To find the reciprocal of a mixed number or whole number, first name it as an improper fraction.

Mixed Number		Improper Fraction		Reciprocal	Check
$2\frac{1}{4}$	$\longrightarrow$	$\frac{9}{4}$	$\longrightarrow$	$\frac{4}{9}$	$\frac{9}{4} \times \frac{4}{9} = \frac{36}{36} = 1$

Whole Number		Improper Fraction		Reciprocal	Check
5	$\longrightarrow$	$\frac{5}{1}$	$\longrightarrow$	$\frac{1}{5}$	$\frac{5}{1} \times \frac{1}{5} = \frac{5}{5} = 1$

The reciprocals of $\frac{2}{3}$, $2\frac{1}{4}$ and 5 are ____, ____ and ____.

Getting Started

Write the reciprocal.

1. $\frac{5}{8}$
2. $\frac{11}{3}$
3. $2\frac{1}{5}$
4. 9
5. $3\frac{1}{3}$

Write the missing factors.

6. $\frac{3}{8} \times$ ____ $= 1$
7. $4\frac{1}{2} \times$ ____ $= 1$
8. $3 \times$ ____ $\times 5 = 1$

Practice

Write the reciprocal.

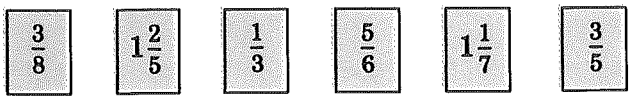
1. $\frac{7}{8}$	2. $2\frac{1}{3}$	3. 7	4. $4\frac{1}{8}$	5. $\frac{1}{9}$
6. $\frac{5}{9}$	7. 12	8. $\frac{17}{100}$	9. 1	10. $6\frac{1}{4}$
11. $\frac{5}{3}$	12. $\frac{9}{10}$	13. 8	14. $9\frac{3}{8}$	15. 69
16. $\frac{3}{110}$	17. $4\frac{3}{4}$	18. $\frac{15}{4}$	19. 14	20. $\frac{3}{17}$
21. 75	22. $\frac{19}{2}$	23. $15\frac{2}{3}$	24. $\frac{15}{16}$	25. $6\frac{7}{9}$

Write the missing factors.

26. $\frac{2}{3} \times \_\_\_\_ = 1$	27. $\_\_\_\_ \times \frac{4}{5} = 1$	28. $2\frac{1}{2} \times \_\_\_\_ = 1$
29. $\_\_\_\_ \times 7\frac{1}{2} = 1$	30. $2\frac{1}{3} \times \_\_\_\_ = 1$	31. $4\frac{2}{3} \times \_\_\_\_ = 1$
32. $\_\_\_\_ \times 6 = 1$	33. $\frac{3}{8} \times \_\_\_\_ = 1$	34. $\_\_\_\_ \times \frac{2}{5} = 1$
35. $2\frac{9}{10} \times \_\_\_\_ = 1$	36. $\_\_\_\_ \times 15 = 1$	37. $\_\_\_\_ \times 6\frac{2}{3} = 1$
38. $\frac{3}{4} \times \_\_\_\_ = 1$	39. $8 \times 7 \times \_\_\_\_ = 1$	40. $2\frac{1}{3} \times \_\_\_\_ \times \frac{3}{7} = 4$
41. $7 \times 5 \times \_\_\_\_ = 1$	42. $3 \times \_\_\_\_ \times 4 = 1$	43. $\_\_\_\_ \times \frac{5}{3} \times 6 = 1$

EXCURSION

These cards are face up on a table.

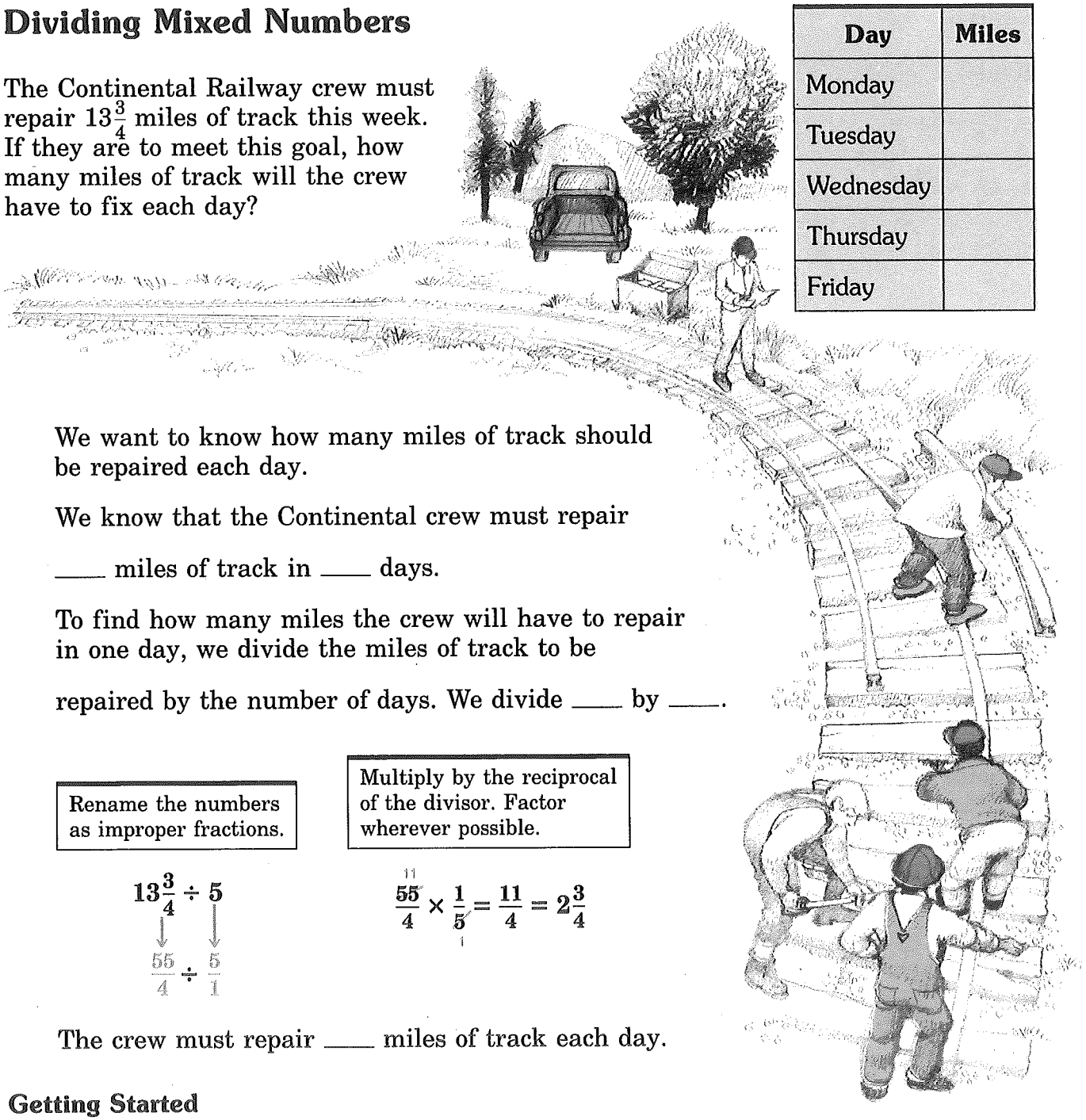


1. Turn over two cards whose difference is $\frac{1}{2}$.
2. Turn over two cards whose sum is $\frac{39}{40}$.
3. Find the product of the two remaining cards.
1. Turn the cards face up again.
2. Turn over two cards whose product is $\frac{3}{7}$.
3. Turn over two cards whose product is less than $\frac{1}{4}$.
4. Find the product of the two remaining cards.

Dividing Mixed Numbers

The Continental Railway crew must repair $13\frac{3}{4}$ miles of track this week. If they are to meet this goal, how many miles of track will the crew have to fix each day?

Day	Miles
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	



We want to know how many miles of track should be repaired each day.

We know that the Continental crew must repair

____ miles of track in ____ days.

To find how many miles the crew will have to repair in one day, we divide the miles of track to be

repaired by the number of days. We divide ____ by ____.

Rename the numbers as improper fractions.

$$13\frac{3}{4} \div 5$$

$$\downarrow \qquad \downarrow$$

$$\frac{55}{4} \div \frac{5}{1}$$

Multiply by the reciprocal of the divisor. Factor wherever possible.

$$\frac{\overset{11}{\cancel{55}}}{4} \times \frac{1}{\underset{1}{\cancel{5}}} = \frac{11}{4} = 2\frac{3}{4}$$

The crew must repair ____ miles of track each day.

Getting Started

Divide.

1. $2\frac{1}{4} \div 1\frac{1}{2} =$ ____
2. $5\frac{1}{3} \div 4 =$ ____
3. $6\frac{1}{4} \div 1\frac{2}{5} =$ ____
4. $6 \div 3\frac{1}{3} =$ ____
5. $\frac{5}{9} \div 1\frac{1}{2} =$ ____
6. $1\frac{3}{4} \div 7 =$ ____
7. $2\frac{1}{3} \div 2\frac{2}{3} =$ ____
8. $1\frac{1}{2} \div 3\frac{2}{3} =$ ____
9. $5\frac{3}{7} \div 1\frac{2}{3} =$ ____

Copy and divide.

10. $2\frac{1}{3} \div 1\frac{2}{5}$
11. $3\frac{3}{8} \div 1\frac{1}{2}$
12. $5 \div 1\frac{3}{7}$
13. $2\frac{1}{4} \div 3\frac{3}{8}$

Practice

Divide.

1. $1\frac{3}{8} \div 11 =$ ____
2. $6 \div 3\frac{3}{5} =$ ____
3. $1\frac{1}{7} \div \frac{6}{7} =$ ____
4. $4\frac{1}{2} \div 1\frac{2}{3} =$ ____
5. $4\frac{1}{8} \div 1\frac{4}{7} =$ ____
6. $2\frac{3}{4} \div 2\frac{4}{9} =$ ____
7. $28 \div 3\frac{1}{2} =$ ____
8. $5\frac{1}{3} \div 1\frac{7}{9} =$ ____
9. $2\frac{2}{5} \div 1\frac{2}{3} =$ ____
10. $3\frac{1}{5} \div 3\frac{1}{10} =$ ____
11. $3\frac{2}{3} \div 2\frac{1}{6} =$ ____
12. $4\frac{1}{5} \div 1\frac{8}{13} =$ ____

Copy and Do

13. $5\frac{7}{9} \div 1\frac{1}{3}$
14. $4\frac{2}{3} \div 1\frac{1}{15}$
15. $2 \div 1\frac{1}{7}$
16. $8\frac{1}{4} \div 3\frac{2}{3}$
17. $5\frac{3}{5} \div 14$
18. $1\frac{1}{8} \div 5\frac{1}{4}$
19. $2\frac{7}{16} \div 1\frac{5}{8}$
20. $1\frac{1}{2} \div 2\frac{1}{3}$
21. $7\frac{1}{2} \div 4\frac{1}{5}$

Apply

Solve these problems.

22. Ben is filling a pail that holds $4\frac{1}{2}$ quarts. He is using a dipper that holds $\frac{3}{4}$ of a quart. How many times will Ben fill the dipper?

23. An ant takes $1\frac{1}{4}$ hours to crawl one block. How many blocks can the ant crawl in 10 hours?

24. Doris ran $3\frac{1}{4}$ miles, $1\frac{3}{4}$ miles and $2\frac{1}{2}$ miles on three different days. What is her average daily mileage?

25. The Indianapolis Speedway Track is $2\frac{1}{2}$ miles long. The race is $\frac{1}{4}$ over after 125 miles. How many laps around the track is the race?

EXCURSION

Circle the correct value for each letter to make the equation true.

A = 1

B = $\frac{1}{3}$ or $\frac{2}{3}$

C = 2 or $\frac{1}{2}$

D = $\frac{2}{3}$ or $\frac{3}{2}$

E = 1

F = $\frac{3}{4}$ or $\frac{4}{3}$

G = 3 or 2

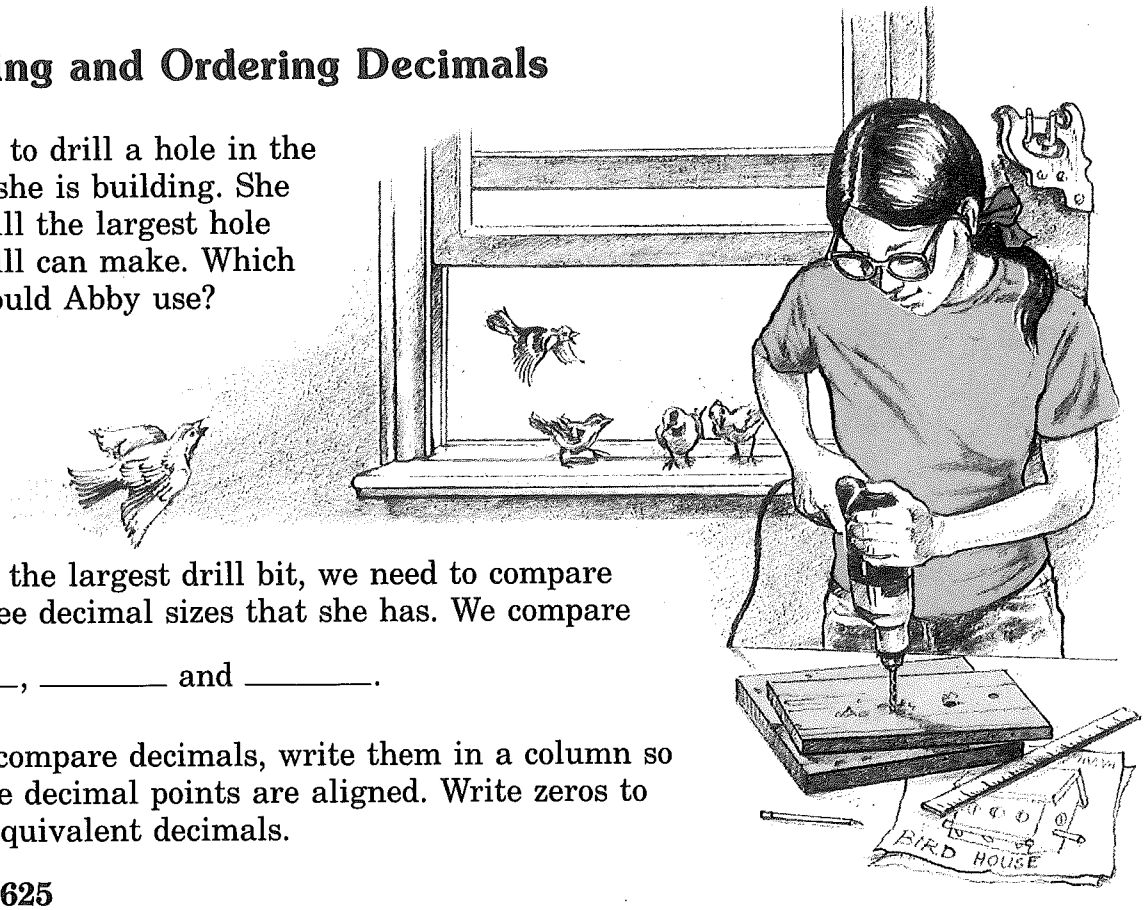
H = $\frac{1}{4}$ or $\frac{1}{2}$

$B + D - A = C \times 2 - A$

$(E + F) \times G \times \frac{1}{7} = F - H$

Comparing and Ordering Decimals

Abby needs to drill a hole in the bird house she is building. She needs to drill the largest hole that her drill can make. Which drill bit should Abby use?



To find the largest drill bit, we need to compare the three decimal sizes that she has. We compare

_____, _____ and _____.

✔ To compare decimals, write them in a column so that the decimal points are aligned. Write zeros to name equivalent decimals.

0.5625
0.6870 0.687 and 0.6870 are equivalent decimals.
0.6250 0.625 and 0.6250 are equivalent decimals.

Start at the left and compare digits. The ones are the same, but the tenths are not.

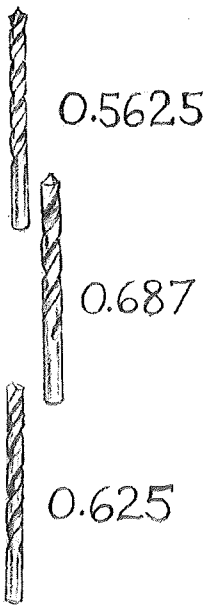
0.5625 Because **5** < **6**, 0.5625 is the smallest drill bit.
0.6870
0.6250

Next compare hundredths.

0.6870 **2** < **8** _____ is the middle-sized drill bit.

0.6250 **8** > **2** _____ is the largest drill bit.

Abby should use the bit labeled _____.



Getting Started

Write >, < or = between the numbers.

1. 0.2431 ◯ 0.2461
2. 7.19 ◯ 7.190
3. 9.273 ◯ 9.372

Order the numbers from least to greatest.

4. 2.59, 2.493, 2.571

_____

5. 6.1351, 6.13, 6.152, 6.143

_____

Practice

Write >, < or = between the numbers.

1. 5.7 ◯ 5.9
2. 3.26 ◯ 3.260
3. 15.27 ◯ 15.72
4. 0.029 ◯ 0.039
5. 6.8325 ◯ 6.8315
6. 10.03 ◯ 10.030
7. 4.129 ◯ 4.1290
8. 1.0025 ◯ 1.025
9. 4.8317 ◯ 4.9317
10. 29.02 ◯ 29.20
11. 16.157 ◯ 16.15
12. 0.2473 ◯ 0.2437
13. 4.19 ◯ 4.1823
14. 5.9620 ◯ 5.9627
15. 3.2841 ◯ 3.2814
16. 0.003 ◯ 0.0003
17. 13.7 ◯ 13.700
18. 9.2 ◯ 9.199

Order the numbers from least to greatest.

19. 3.26, 3.45, 3.3

_____

20. 5.285, 5.825, 5.582

_____

21. 0.02, 0.002, 0.2

_____

22. 4.15, 4.29, 4.265

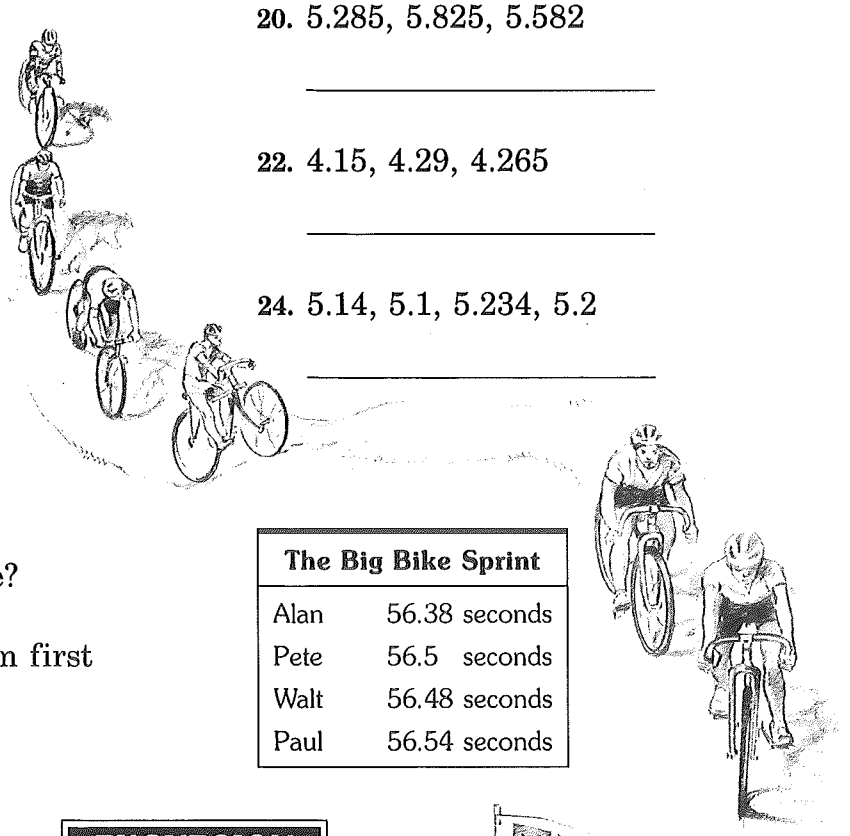
_____

23. 8.2416, 8.4261, 8.3416

_____

24. 5.14, 5.1, 5.234, 5.2

_____



Apply

Solve these problems.

25. Which was the fastest time?

26. List the order of finish from first through fourth.

The Big Bike Sprint	
Alan	56.38 seconds
Pete	56.5 seconds
Walt	56.48 seconds
Paul	56.54 seconds

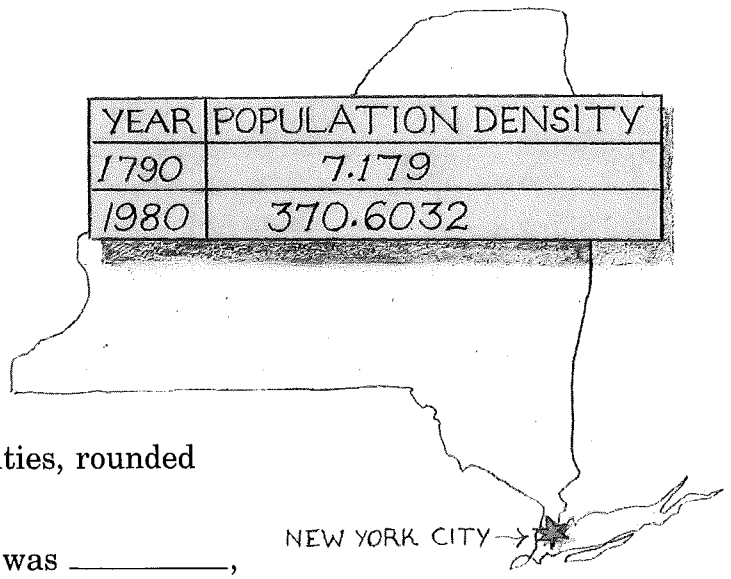
EXCURSION

Use the digits 6, 7 and 8 to make six different decimal numbers.
Write a check next to the least.
Write an X next to the greatest.

Rounding Decimals

Population density describes the number of people there are in each square mile of an area. Rounded to the nearest hundredth what were the population densities of New York City in 1790 and 1980?

YEAR	POPULATION DENSITY
1790	7.179
1980	370.6032



We want to know the population densities, rounded to the nearest hundredth.

We know the 1790 population density was _____,

and the 1980 density was _____.

To round a decimal number,
circle the digit in the place you want to round.

7.1⑦9 **3 7 0.6⓪3 2**

Look at the digit to the right of the one circled.

If the digit is 5 or greater, add 1 to the circled number and drop all digits to the right.

7.1⑦9 **9 > 5** **7.179 ≈ 7.18**

If the digit is less than 5, keep the circled number and drop all digits to the right.

3 7 0.6⓪3 2 **3 < 5** **370.6032 ≈ 370.60**

The sign ≈ is read **is approximately.**

To the nearest hundredth, the population density of

New York was _____ in 1790, and _____
in 1980.

Getting Started

Round to the nearest whole number.

1. 6.437 _____ 2. 94.86 _____

Round to the nearest tenth.

3. 11.734 _____ 4. 215.963 _____

Round to the nearest hundredth.

5. 7.999 _____ 6. 13.534 _____

Round to the nearest thousandth.

7. 0.46581 _____ 8. 6.92952 _____

Practice

Round to the nearest whole number.

1. 136.29 _____ 2. 14.765 _____ 3. 9.27 _____ 4. 12.565 _____

5. 18.5 _____ 6. 37.032 _____ 7. 3.8091 _____ 8. 116.99 _____

Round to the nearest tenth.

9. 7.39 _____ 10. 0.826 _____ 11. 25.45 _____ 12. 39.06 _____

13. 115.26 _____ 14. 59.96 _____ 15. 210.53 _____ 16. 64.39 _____

Round to the nearest hundredth.

17. 28.735 _____ 18. 19.158 _____ 19. 37.678 _____ 20. 9.241 _____

21. 112.999 _____ 22. 7.046 _____ 23. 14.393 _____ 24. 416.595 _____

Round to the nearest thousandth.

25. 8.53967 _____ 26. 0.76463 _____ 27. 12.98362 _____ 28. 4.58467 _____

29. 16.37995 _____ 30. 42.64821 _____ 31. 3.54545 _____ 32. 7.91659 _____

Apply

Solve these problems.

33. The population density of Colorado is 27.89. What is the density of Colorado, rounded to the nearest tenth?

34. The population density of Kansas is 28.909. What is the density of Kansas rounded to the nearest hundredth?

EXCURSION

Complete the following. Use the pattern set up in the first sentence.

About 3.5 means at least 3.45 and at most 3.54.

About 4.7 means at least _____ and at most _____.

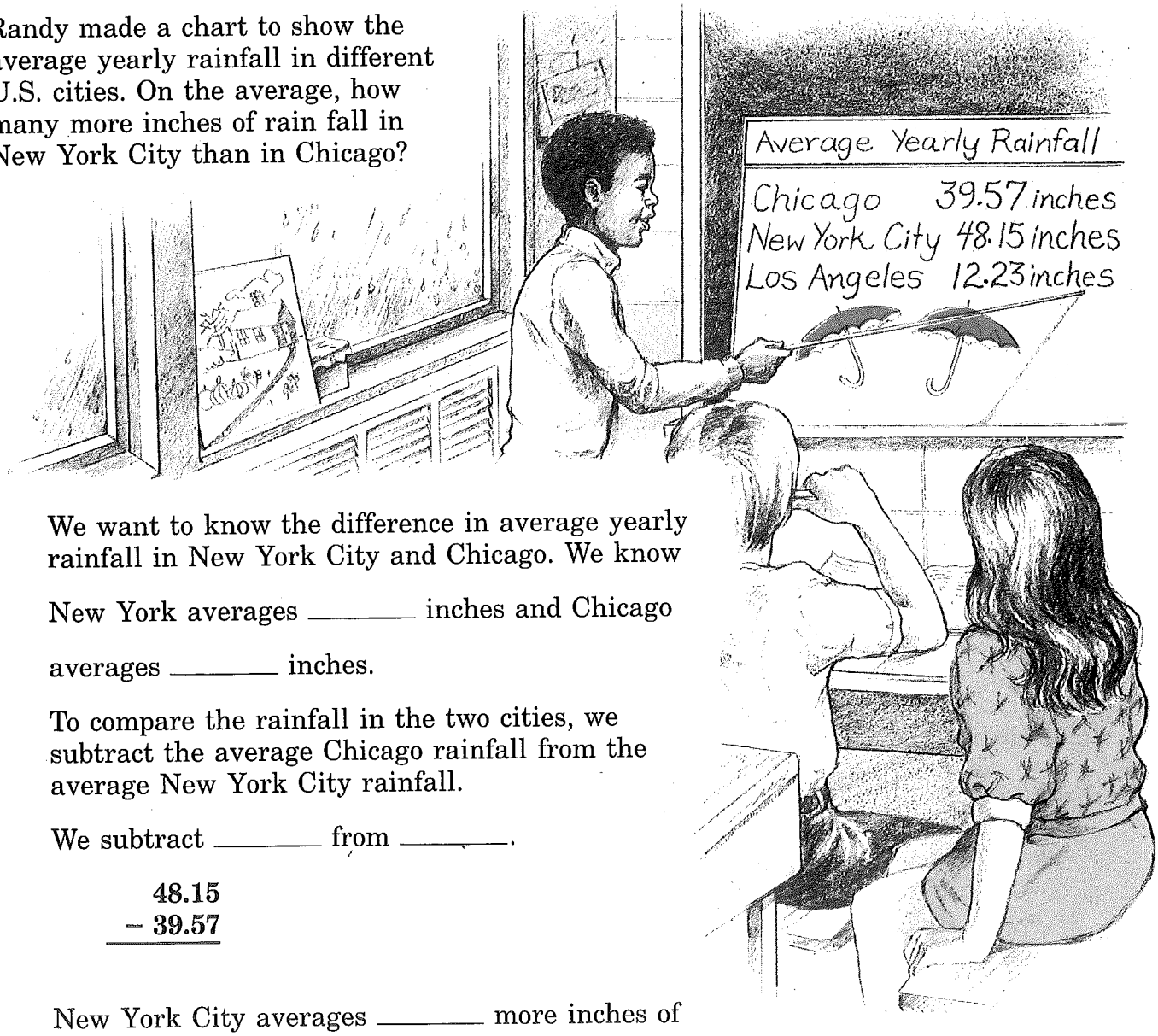
About 18.0 means at least _____ and at most _____.

About 8.32 means at least _____ and at most _____.

About 50¢ means at least _____ and at most _____.

Adding and Subtracting Decimals

Randy made a chart to show the average yearly rainfall in different U.S. cities. On the average, how many more inches of rain fall in New York City than in Chicago?



We want to know the difference in average yearly rainfall in New York City and Chicago. We know

New York averages _____ inches and Chicago averages _____ inches.

To compare the rainfall in the two cities, we subtract the average Chicago rainfall from the average New York City rainfall.

We subtract _____ from _____.

$$\begin{array}{r} 48.15 \\ -\ 39.57 \\ \hline \end{array}$$

New York City averages _____ more inches of rain than Chicago per year.

Getting Started

Compute.

1. $\begin{array}{r} 97.3 \\ -\ 16.45 \\ \hline \end{array}$

2. $\begin{array}{r} 32.9 \\ -\ 16.63 \\ \hline \end{array}$

3. $\begin{array}{r} 112.476 \\ -\ 96.789 \\ \hline \end{array}$

4. $\begin{array}{r} 4.093 \\ +\ 8.97 \\ \hline \end{array}$

Copy and compute.

5. $39.7 + 18.9 - 15.6$

6. $5.89 - 3.341 + 14$

7. $6.2 + 3.96 + 8.54$

8. $24.61 + 18.21 - 3.75$

9. $19.61 - 8.75 + 2.95$

10. $3.01 + 120.72 - 8.08$

Practice

Compute.

1. $\begin{array}{r} 16.91 \\ +\ 15.86 \\ \hline \end{array}$	2. $\begin{array}{r} 37.21 \\ -19.58 \\ \hline \end{array}$	3. $\begin{array}{r} 32.5 \\ +\ 18.63 \\ \hline \end{array}$	4. $\begin{array}{r} 75.2 \\ -\ 17.58 \\ \hline \end{array}$
5. $\begin{array}{r} 126.2 \\ -\ 97.851 \\ \hline \end{array}$	6. $\begin{array}{r} 52.483 \\ +\ 78.925 \\ \hline \end{array}$	7. $\begin{array}{r} 89.58 \\ -\ 23.965 \\ \hline \end{array}$	8. $\begin{array}{r} 49.008 \\ -\ 15.779 \\ \hline \end{array}$
9. $\begin{array}{r} 156.17 \\ +\ 28.3954 \\ \hline \end{array}$	10. $\begin{array}{r} 175.43 \\ -\ 98.7658 \\ \hline \end{array}$	11. $\begin{array}{r} 415.673 \\ -\ 295.873 \\ \hline \end{array}$	12. $\begin{array}{r} 515.2843 \\ +\ 329.7689 \\ \hline \end{array}$

Copy and Do

13. $75.2 + 18.6 - 65.3$

14. $82.16 - 13.29 + 16.5$

15. $4.962 + 6.83 - 4.759$

16. $25.371 + 13.7 + 19.651$

17. $39 - 16.28 + 15.75$

18. $96.136 + 48.792 - 63.4248$

Apply

Solve these problems.

19. The maximum weight of a full container is 19.325 kilograms. Into the container, Larry put one object that weighs 9.5 kilograms and another that weighs 7.75 kilograms. How much more weight can Larry put into the container?

20. In one year, 42.8 million passengers passed through O'Hare Airport in Chicago, and 37.9 million passengers went through the Atlanta Airport. The Los Angeles Airport had 4.5 million fewer passengers than did the Atlanta Airport. In all, how many passengers passed through these three airports?

Mr. Martinez kept track of the miles he drove in a car he rented at the airport.

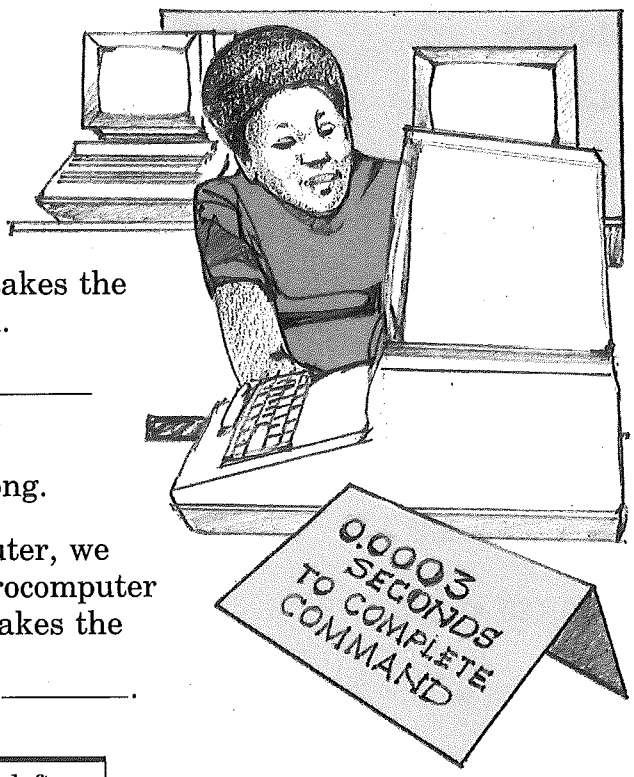
21. How far did Mr. Martinez drive?

22. How much farther did Mr. Martinez drive on Monday and Tuesday than Wednesday and Thursday?

Driving Record	
Monday	365.7
Tuesday	149.35
Wednesday	296.5
Thursday	213.86

Multiplying with Zeros in the Products

The minicomputer can complete a command in 0.5 of the time it takes the microcomputer to do the same job. How long does it take this minicomputer to complete an instruction?



We want to know how many seconds it takes the minicomputer to complete an instruction.

We know that a microcomputer takes _____ seconds to complete a command, and the minicomputer takes _____ times as long.

To find how long it takes the minicomputer, we multiply the number of seconds the microcomputer uses by the number of times as long it takes the minicomputer. We multiply _____ by _____.

Multiply.

$$\begin{array}{r} 0.0003 \\ \times \quad 0.5 \\ \hline 1\ 5 \end{array}$$

Write zeros to the left of the product to get the correct number of places.

$$\begin{array}{r} 0.0003 \leftarrow \text{4 places} \\ \times \quad 0.5 \leftarrow \text{+ 1 place} \\ \hline 0.00015 \leftarrow \text{5 places} \end{array}$$

Check by multiplying fractional equivalents.

$$\frac{3}{10{,}000} \times \frac{5}{10} = \frac{15}{100{,}000}$$

It takes the minicomputer _____ seconds to complete a command.

Getting Started

Multiply.

1. $\begin{array}{r} 3.26 \\ \times\ 0.01 \\ \hline \end{array}$
2. $\begin{array}{r} 0.003 \\ \times\ \ 12 \\ \hline \end{array}$
3. $\begin{array}{r} 0.03 \\ \times\ 0.06 \\ \hline \end{array}$
4. $\begin{array}{r} 4.24 \\ \times\ 0.005 \\ \hline \end{array}$
5. $\begin{array}{r} 0.02 \\ \times\ 0.03 \\ \hline \end{array}$
6. $\begin{array}{r} 9.21 \\ \times\ 0.005 \\ \hline \end{array}$
7. $\begin{array}{r} 0.008 \\ \times\ 0.005 \\ \hline \end{array}$
8. $\begin{array}{r} 6.01 \\ \times\ 0.006 \\ \hline \end{array}$

Copy and multiply.

9. 0.375×0.005
10. $0.07 \times 0.05 \times 0.02$
11. $0.06 \times 0.09 \times 5.8$

Practice

Multiply.

1. 3.2×0.04	**2.** 0.006×4	**3.** 0.02×0.02	**4.** 4.1×0.005
5. 15.2×0.003	**6.** 0.006×0.008	**7.** 0.058×0.05	**8.** 0.009×16

Copy and Do

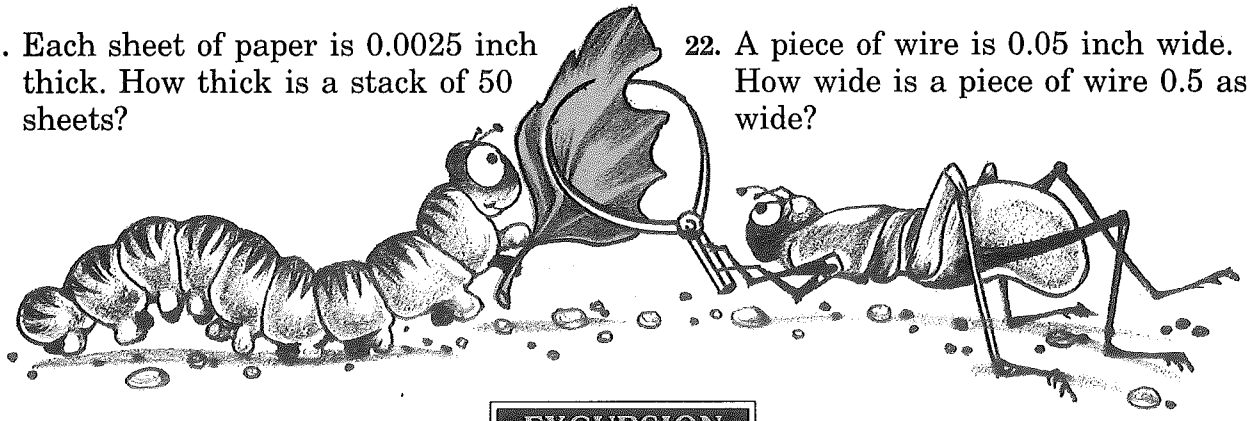
9. 0.3×0.3	**10.** 1.6×0.005	**11.** 0.002×3.56
12. 0.007×2.3	**13.** 0.0006×2.21	**14.** 8.3×0.0041
15. 0.125×0.005	**16.** 4.04×0.004	**17.** 0.0047×0.59
18. $0.03 \times 0.04 \times 2.3$	**19.** $0.9 \times 4.7 \times 0.005$	**20.** $0.05 \times 0.02 \times 0.06$

Apply

Solve these problems.

21. Each sheet of paper is 0.0025 inch thick. How thick is a stack of 50 sheets?

22. A piece of wire is 0.05 inch wide. How wide is a piece of wire 0.5 as wide?



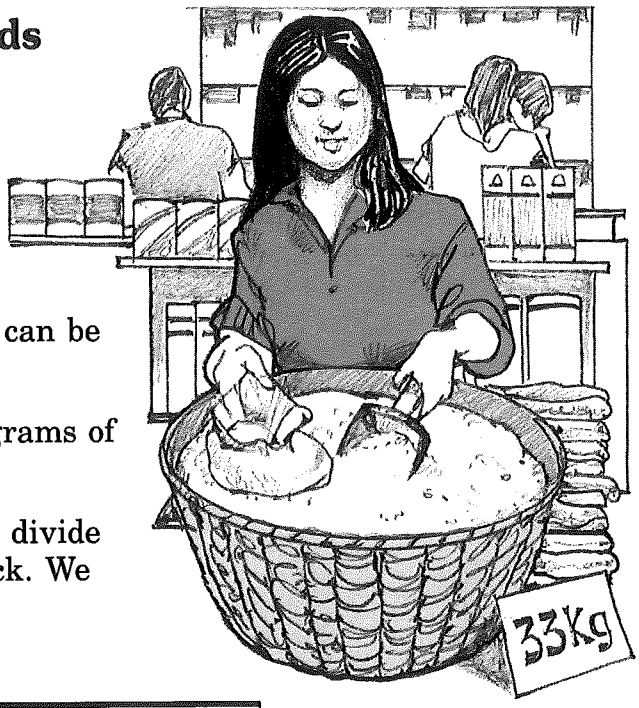
EXCURSION

Write the missing numbers.

0.7	+		=	1.5
+		+		+
	+	0.4	=	
=		=		=
	+		=	2.5

	−	0.45	=	1.8
−		−		−
1.65	−		=	
=		=		=
	−	0.3	=	

Dividing with Zeros in the Dividends



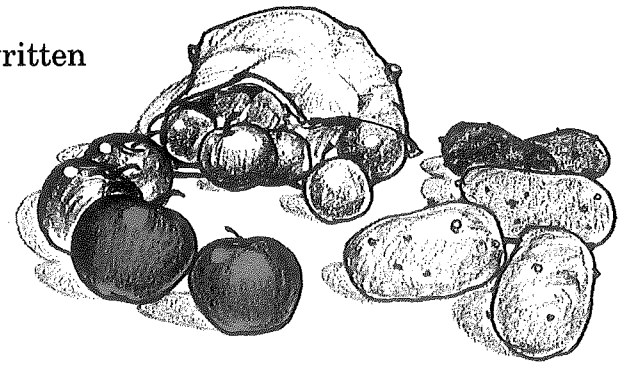
Shelby is working at a co-op produce store. She is putting 2.75 kilograms of rice into each sack. How many sacks of rice will Shelby fill from the basket of rice?

We want to know the number of sacks that can be filled with equal amounts of rice.

We know that the basket holds _____ kilograms of rice, and each sack holds _____ kilograms.
To find how many sacks Shelby can fill, we divide the total amount by the amount in each sack. We divide _____ by _____.

Write extra zeros after the decimal point in the dividend.	Multiply to make the divisor a whole number. Multiply the dividend by the same power of 10.	Divide.
$2.75\overline{)33.00}$	$2.75\overline{)33.00}$	$2.75\overline{)33.00}$

✔ Remember, any number of zeros can be written to the far right of a decimal number without changing its value.



Shelby will fill _____ sacks of rice.

Getting Started

Divide.

1. $5.2\overline{)104}$
2. $0.6\overline{)0.3}$
3. $0.09\overline{)1.8}$
4. $1.2\overline{)360}$
5. $0.51\overline{)10.2}$
6. $0.032\overline{)40}$

Copy and divide.

7. $72 \div 1.6$
8. $3.44 \div 0.08$
9. $128 \div 0.8$

Practice

Divide.

1. $0.4\overline{)164}$
2. $0.07\overline{)16.1}$
3. $0.005\overline{)210}$
4. $1.3\overline{)312}$
5. $0.015\overline{)10.05}$
6. $0.048\overline{)3.36}$
7. $5.4\overline{)108}$
8. $0.67\overline{)455.6}$
9. $0.45\overline{)0.0162}$

Copy and Do

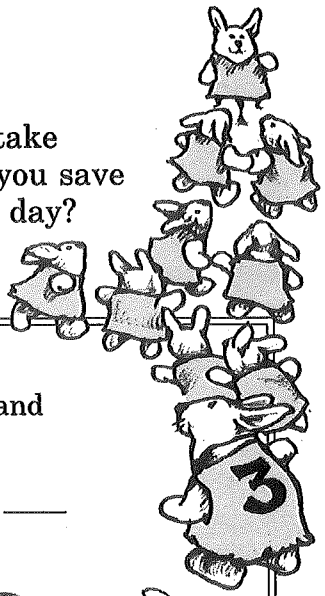
10. $630 \div 0.3$
11. $96 \div 0.6$
12. $4.8 \div 0.08$
13. $63 \div 1.4$
14. $184.8 \div 0.33$
15. $675 \div 0.9$
16. $1{,}909 \div 0.83$
17. $2.52 \div 0.07$
18. $12.9 \div 2.15$

Apply

Solve these problems.

19. A rope is 17.4 meters long. How many 0.03-meter pieces can be cut from the rope?

20. How long will it take to save \$22.80 if you save \$0.38 every other day?



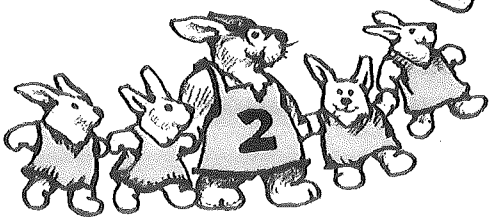
EXCURSION

A special operation is called **SquareAdd.** We square the first number and add the second. For example, 3 SquA 2 = $3^2 + 2 = 11$

1. 5 SquA 3 = ____
2. 2 SquA 7 = ____
3. 6 SquA 1 = ____

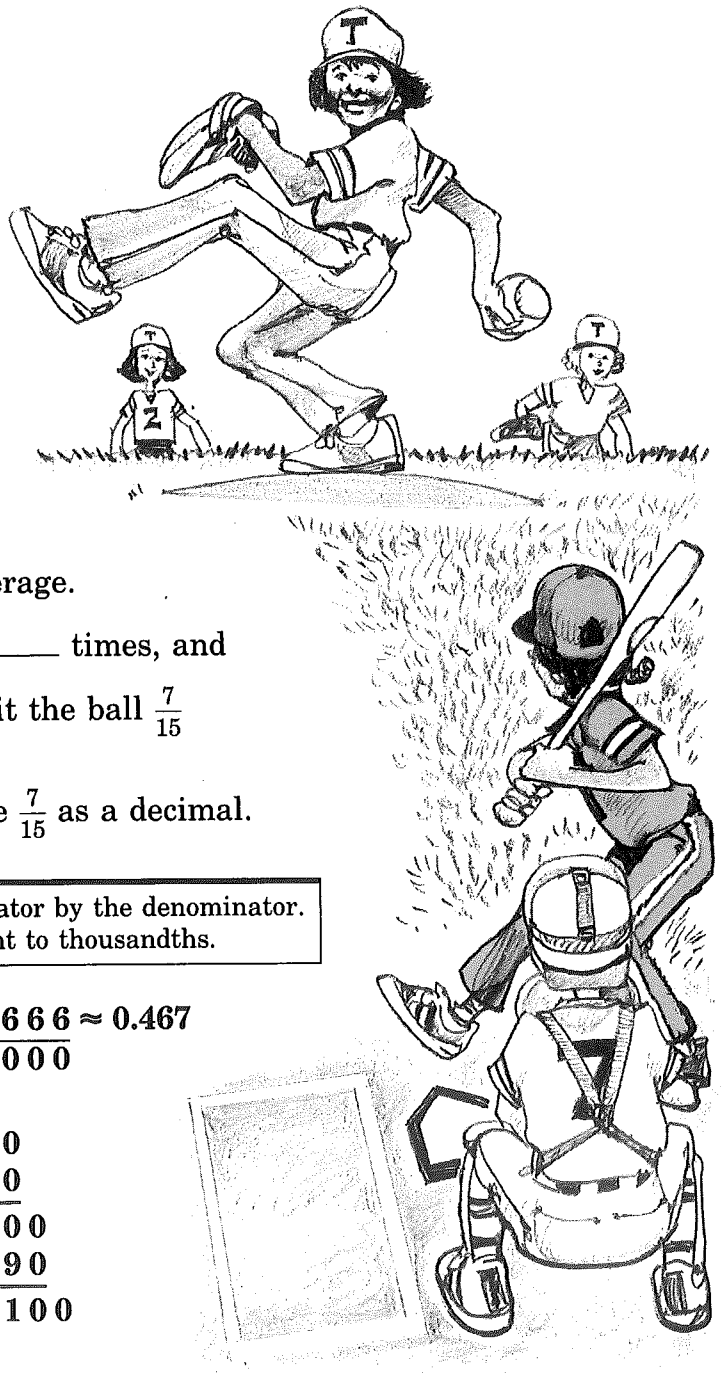
Answer yes or no.

4. Does 2 SquA 5 = 5 SquA 2? ____
5. Does 4 SquA 3 + 5 SquA 3 = (4 + 5) SquA 3? ____
6. Does 5 SquA 2 + 3 SquA 2 = (5 × 3) SquA 2? ____



Renaming Fractions as Decimals

Marie is the lead-off hitter on the softball team. What is Marie's batting average to the nearest thousandths?



Lincoln Batting Averages			
Girl	**At Bat**	**Hits**	**Average**
Marie	15	7	?
Rita	13	6	?
Joan	16	7	?

We want to know Marie's batting average.

We know that she has been at bat _____ times, and she has had _____ hits. Marie has hit the ball $\frac{7}{15}$ of the time.

To find her batting average, we name $\frac{7}{15}$ as a decimal.

Write the fraction as a division.	Divide the numerator by the denominator. Round the quotient to thousandths.

$\frac{7}{15} = 15\overline{)7}$

$$\begin{array}{r} 0.4666 \approx 0.467 \\ 15\overline{)7.0000} \\ \underline{60} \\ 100 \\ \underline{90} \\ 100 \\ \underline{90} \\ 100 \end{array}$$

Marie has a batting average of _____.

✔ Some fractions are renamed as decimals in tenths or hundredths. Others don't have an exact decimal equivalent. These we usually round to a particular place value.

Getting Started

Rename these fractions as decimals. Round to the nearest hundredths.

1. $\frac{2}{3}$ 2. $\frac{5}{6}$ 3. $\frac{1}{16}$ 4. $\frac{1}{12}$ 5. $\frac{3}{8}$

Practice

Rename these fractions as decimals. Round to the nearest hundredths.

1. $\frac{1}{6}$	2. $\frac{5}{12}$	3. $\frac{1}{2}$	4. $\frac{3}{16}$	5. $\frac{5}{8}$
6. $\frac{4}{7}$	7. $\frac{3}{13}$	8. $\frac{7}{11}$	9. $\frac{3}{4}$	10. $\frac{1}{8}$
11. $\frac{7}{16}$	12. $\frac{8}{9}$	13. $\frac{1}{7}$	14. $\frac{11}{15}$	15. $\frac{17}{20}$
16. $\frac{3}{11}$	17. $\frac{17}{25}$	18. $\frac{5}{9}$	19. $\frac{7}{8}$	20. $\frac{1}{12}$

Apply

Solve these problems. Round answers to thousandths.

21. The Eliot basketball team played 18 games and won 11 of them. What is the Eliot basketball team's winning average?

22. In the free throw contest, Ken made 9 shots and missed 5 shots. What is his shooting average?

23. Dennis was at bat 54 times and struck out only 14 times. What is his batting average?

24. Bill has 5 hits in 8 times at bat. How much will his batting average increase if he gets 2 hits in his next 2 turns at bat?

EXCURSION

When the only prime factors of the denominator are 2 or 5, the decimal will have no remainder.

$$\frac{1}{8} = 8\overline{)1.000}$$

$$\begin{array}{r} 0.125 \\ 8\overline{)1.000} \\ \underline{8} \\ 20 \\ \underline{16} \\ 40 \\ \underline{40} \\ 0 \end{array}$$

When the prime factors of the denominator include factors other than 2 or 5, the decimal has a repeating remainder.

$$\begin{array}{r} 0.333 \\ 3\overline{)1.000} \\ \underline{9} \\ 10 \\ \underline{9} \\ 10 \end{array}$$

$\frac{1}{3} =$

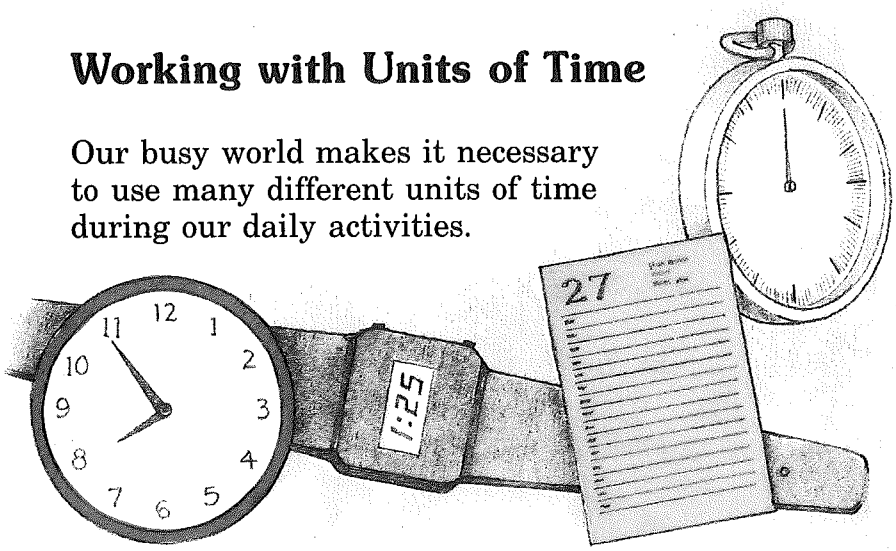
Circle the fractions that will have a repeating remainder.

$\frac{3}{4}$ $\frac{1}{7}$ $\frac{2}{3}$ $\frac{7}{8}$ $\frac{1}{12}$ $\frac{7}{9}$ $\frac{3}{5}$ $\frac{5}{11}$ $\frac{4}{15}$ $\frac{3}{10}$

10 MEASUREMENT

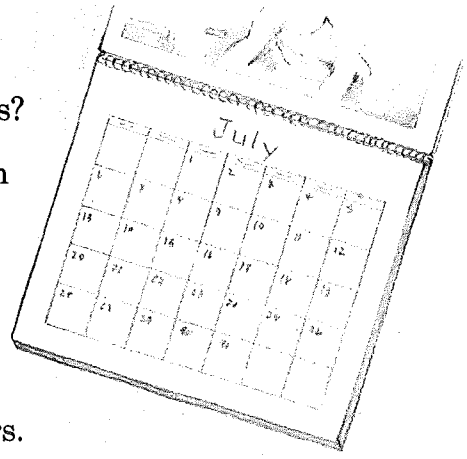
Working with Units of Time

Our busy world makes it necessary to use many different units of time during our daily activities.



60 seconds (sec) = 1 minute (min)
60 minutes = 1 hour (h)
24 hours = 1 day (d)

365 days = 1 year (yr)
7 days = 1 week (wk)
52 weeks = 1 year
12 months (mo) = 1 year
10 years = 1 decade
100 years = 1 century



We often have to change from one unit to another.
How many hours and minutes are there in 158 minutes?

158 minutes = 158 ÷ 60 = 2 R38 = ____ hr ____ min

How many years and months are there in 39 months?

39 months = 39 ÷ 12 = 3 R3 = ____ yr ____ mo

How many hours are there in 6 days and 9 hours?

6 days = 6 × 24 = 144 hours + 9 hours = ____ hours.

We can add or subtract units of time.

5 h 28 min
+ 2 h 52 min
7 h 80 min

Rename 80 min as 1 h 20 min.

8 h ____ min

18 75
~~19~~ min ~~15~~ sec
− 6 min 38 sec

Rename 1 min as 60 sec.

Getting Started

Rename the units of time.

1. 400 min = ____ h ____ min
2. 8 wk 2 d = ____ d
3. 4 yr 21 wk = ____ wk

Add or subtract.

4. 6 h 36 min
   − 2 h 29 min
5. 13 min 45 sec
   + 12 min 36 sec
6. 9 h 15 min 7 sec
   − 3 h 6 min 45 sec

Practice

Rename the units of time.

1. 6 wk 3 d = _____ d
2. 27 mo = _____ yr _____ mo
3. 57 d = _____ wk _____ d
4. 146 min = _____ h _____ min
5. 63 h = _____ d _____ h
6. 265 min 14 sec = _____ sec
7. 3 yr 12 wk = _____ wk
8. 6 d = _____ h
9. 3 wk 4 d = _____ d
10. 8 h = _____ sec
11. 810 d = _____ yr _____ d
12. 75 wk = _____ yr _____ d
13. 487 min = _____ h _____ min
14. 3 h 4 min 59 sec = _____ sec
15. 82 yr = _____ d
16. 10 yr = _____ wk
17. 107 mo = _____ yr _____ mo
18. 97 h = _____ sec

Add or subtract.

19. 5 wk 4 d + 1 wk 8 d
20. 3 d 14 h + 2 d 16 h
21. 14 h 12 min − 9 h 36 min
22. 15 min 46 sec + 17 min 18 sec
23. 14 wk 3 d − 6 wk 5 d
24. 6 h 25 min + 2 h 39 min
25. 11 h 6 min − 4 h 25 min
26. 2 yr 214 d + 3 yr 163 d
27. 48 min 16 sec − 12 min 45 sec
28. 38 wk 6 d + 6 wk 6 d
29. 14 min 29 sec + 18 min 53 sec
30. 10 h 15 min − 6 h 35 min

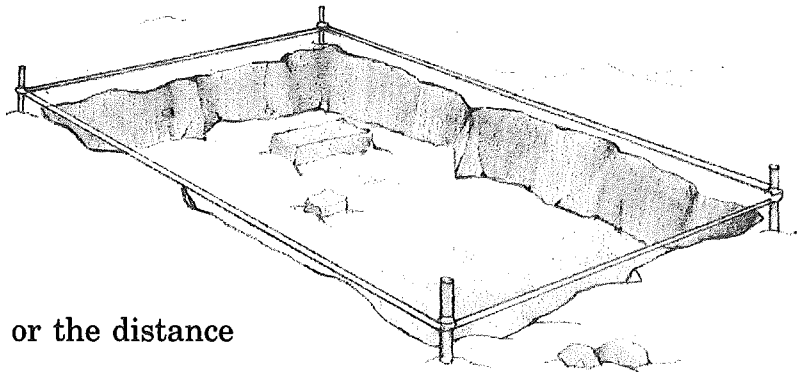
Apply

Solve these problems.

31. Mary worked out in the gym 2 hours and 28 minutes on Monday. Her workout lasted 1 hour and 35 minutes on Tuesday. How long did Mary work out on Monday and Tuesday?

32. Don agreed to work for 8 hours. He worked 3 hours and 32 minutes on Saturday and 2 hours and 25 minutes on Sunday. How much more time does Don need to work?

Computing Perimeters

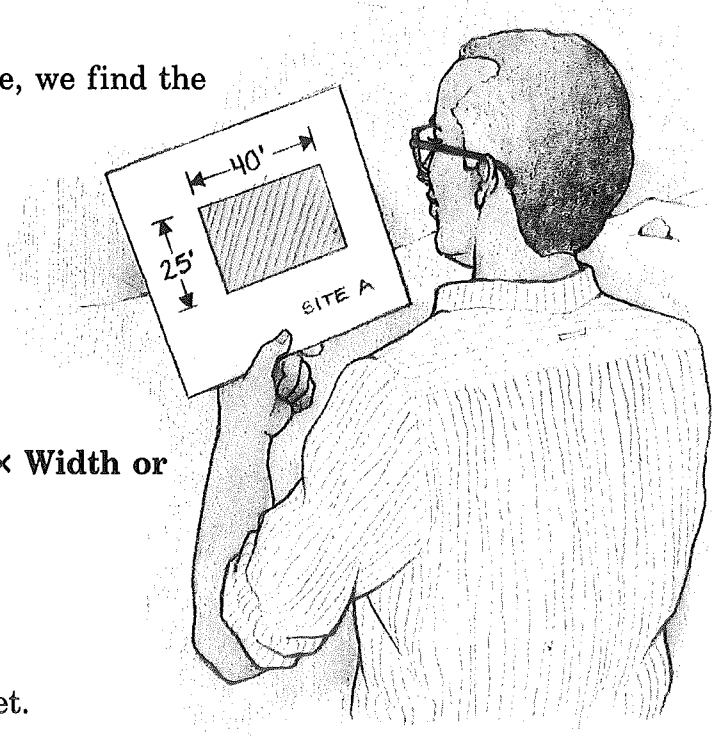


Professor Landon is putting a fence around the archeological dig he started by the river. The distance around a flat region is called the **perimeter.** What is the perimeter of Professor Landon's dig?

We want to know the perimeter, or the distance around the site.

We know that the length of the dig is ____ feet and it is ____ feet wide.

To find the perimeter of a rectangle, we find the sum of the lengths of the sides.



40 ft
25 ft
40 ft
+ 25 ft

Or we can use the formula:

Perimeter = 2 × Length + 2 × Width or
P = 2 × (L + W)
P = 2 × (40 + 25)
P = 2 × 65

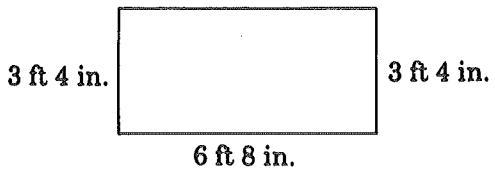
P = ____

The perimeter of the dig is ____ feet.

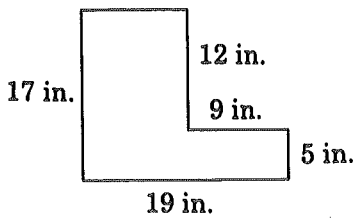
Getting Started

Find the perimeter.

1.



2.



Find the perimeter of each rectangle.

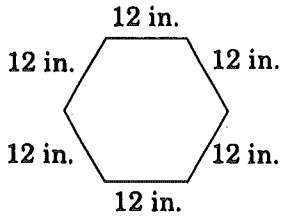
3. Length: 25 in.
   Width: 16 in.

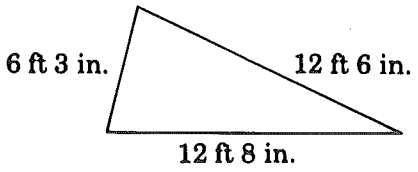
4. Length: $3\frac{1}{2}$ ft
   Width: 7 ft

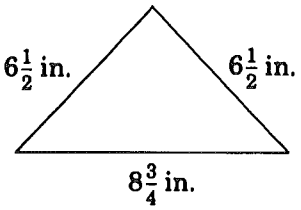
5. Length: 6 yd
   Width: 6 yd

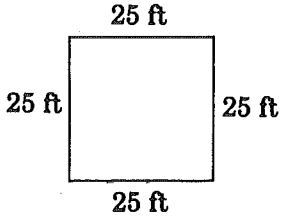
Practice

Find the perimeter.

1. 

2. 

3. 

4. 

Find the perimeter of each rectangle.

5. Length: 21 ft
   Width: 7 ft

6. Length: $6\frac{3}{4}$ in.
   Width: $8\frac{1}{2}$ in.

7. Length: 3.5 ft
   Width: 1.6 ft

8. Length: $12\frac{2}{3}$ ft
   Width: $8\frac{1}{2}$ ft

9. Length: 16 in.
   Width: 24 in.

10. Length: 16 in.
    Width: $2\frac{1}{2}$ ft

11. Length: 27 ft
    Width: 18 in.

12. Length: $2\frac{1}{4}$ in.
    Width: $8\frac{1}{2}$ in.

13. Length: $17\frac{3}{8}$ ft
    Width: $12\frac{2}{5}$ ft

Apply

Solve these problems. Draw a picture to help.

14. A lot in the shape of a triangle is 48 feet on each side. What is the perimeter of the lot?

15. A square has a perimeter of 64 inches. How long is each side?

16. The Martins are fencing in a rectangular yard. The cost of the fence is $8.75 per foot. If the yard is 25 feet long and 30 feet wide, what will it cost to fence the yard?

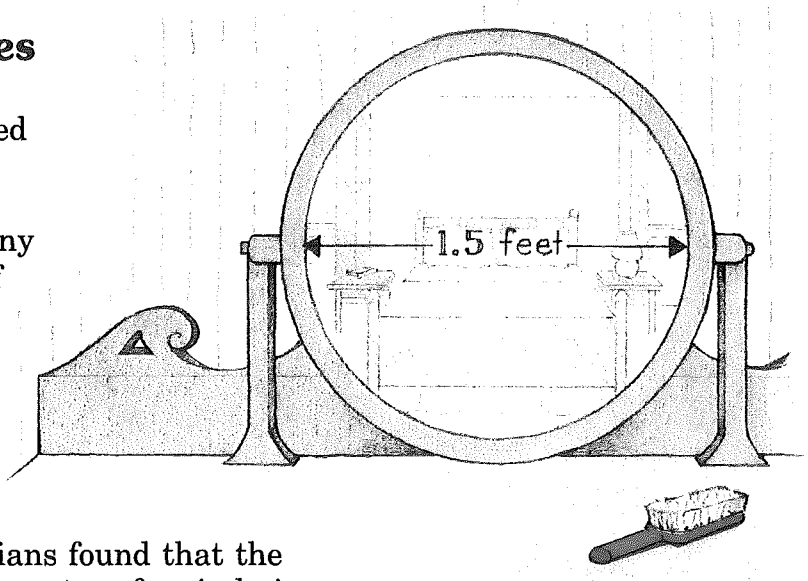
17. The width of a rectangle is twice its length. The perimeter is 48 inches. How wide is the rectangle?

18. Charmaine is buying fabric to make a dress. She needs a piece of silk $4\frac{3}{8}$ yards long by 36 inches wide. How many yards is the perimeter of Charmaine's fabric?

19. Bela is putting a border of tile around his bathroom. Each tile is 6 inches wide. How many tiles will Bela need if his bathroom is 6 feet long and 8 feet wide?

Computing Circumferences

The distance around a circle is called its **circumference.** The distance across the center of a circle is called its **diameter.** About how many times larger is the circumference of a circle than its diameter?



The ancient Greek mathematicians found that the circumference divided by the diameter of a circle is always the same. They named this number with the Greek letter **pi,** π. We use 3.14 as the approximate value of π.

The circumference of a circle is _____ times larger than its diameter.
This comparison can be shown by the formula:

Circumference = pi times diameter
$C = \pi \times d$
$C = 3.14 \times d$

To find the circumference of the bedroom mirror,

we multiply pi by the diameter. We multiply _____

by _____.

$$\begin{array}{r} 3.14 \\ \times\ \ 1.5 \\ \hline \end{array}$$

The circumference of the mirror is _____.

Getting Started

Find the circumference.

1. d = 4 in.

2. d = 1.5 yd

3. d = 2.25 ft

Complete the table.

4.

diameter	5.1 in.	7 ft	4.25 yd	8 ft
circumference				

Practice

Find the circumference.

1. d = 3 in.
2. d = 1.8 ft
3. d = 9 ft
4. d = 12 ft
5. d = 7 yd
6. d = $2\frac{1}{2}$ in.
7. d = 3.72 in.
8. d = 4.5 yd
9. d = 7.05 ft
10. d = 86 yd
11. d = 29 ft
12. d = .06 yd

Complete the table.

13.

diameter	3.2 in.	4 ft	3.65 yd	5 ft	4.5 yd	6.65 ft	24 in.
circumference							

Apply

Solve these problems.

14. A ball has a diameter of 9 inches. How far will the ball roll in one complete turn?

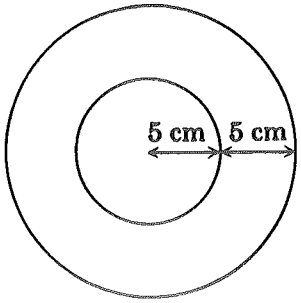
15. A bicycle wheel has a diameter of 32 inches. How far will the bike travel after the wheel makes 6 full turns?

16. Martin is putting a low fence around a circular fishpond that has a diameter of 4 feet. The fence material costs $6.80 a foot. To the nearest cent, how much is the fence material?

17. Ann is running a circular track that has a 133.33 yard diameter. To the nearest yard, how far is it around the track?

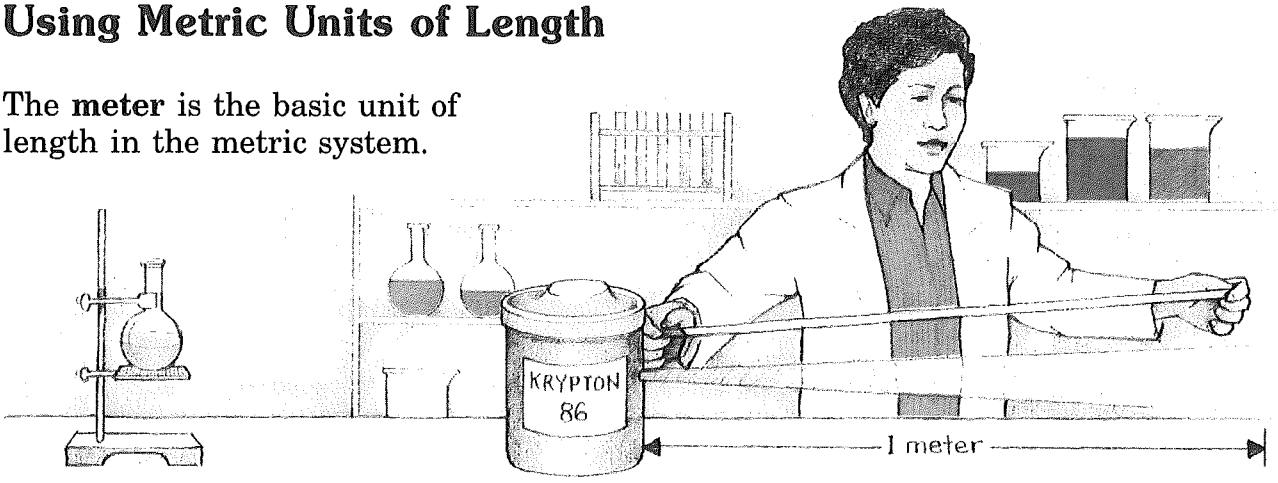
EXCURSION

How much smaller is the circumference of the small circle than the circumference of the large circle?



Using Metric Units of Length

The **meter** is the basic unit of length in the metric system.



The metric system is based on powers of 10. Each unit is 10 times greater than the next smaller unit, and 0.1 the size of the next larger unit.

kilometer (km)	hectometer (hm)	decameter (dam)	basic unit (m)	decimeter (dm)	centimeter (cm)	millimeter (mm)
1,000 m	100 m	10 m	1 m	0.1 m	0.01 m	0.001 m

How many millimeters are in 1.5 meters?
How many kilometers are in 3,500 meters?

✔ To rename a larger unit as a smaller unit, multiply by the corresponding power of 10. To rename 1.5 meters as millimeters, multiply by 1,000.

1.5 × 1,000 = _____

There are _____ millimeters in 1.5 meters.

✔ To rename a smaller unit as a larger unit, divide by the corresponding power of 10. To rename 3,500 meters as kilometers, divide by 1,000.

3,500 ÷ 1,000 = _____

There are _____ kilometers in 3,500 meters.

Getting Started

Rename.

1. 3 cm = _____ mm
2. 2 m = _____ cm
3. 25 mm = _____ m
4. 20 cm = _____ dm
5. 16.5 cm = _____ mm
6. 86,000 mm = _____ m

Write >, < or =.

7. 43 m ___ 4.3 km
8. 26 cm ___ 260 mm
9. 350 dm ___ 3.5 m
10. 8.2 m ___ 82 km
11. 760 cm ___ 7.6 dm
12. 1,200 mm ___ 1.2 m

Practice

Find the missing number.

1. 1 cm = _____ mm
2. 2.5 km = _____ m
3. 15 dm = _____ m
4. 6 m = _____ cm
5. 0.025 m = _____ mm
6. 525 m = _____ km
7. 146 dam = _____ km
8. 28.6 m = _____ mm
9. 0.78 dm = _____ m
10. 250 m = _____ km
11. 326 hm = _____ m
12. 4.95 m = _____ cm
13. 12 mm = _____ cm
14. 6 km = _____ m
15. 75 cm = _____ m
16. 0.38 dam = _____ m
17. 25 dm = _____ cm
18. 159.6 mm = _____ cm

Write >, < or =.

19. 45 cm ___ 4.5 mm
20. 3 m ___ 300 dm
21. 5 km ___ 500 m
22. 1.5 m ___ 150 cm
23. 560 m ___ 5.6 hm
24. 180 cm ___ 1.8 mm
25. 200 cm ___ 0.2 m
26. 0.321 km ___ 3,210 cm
27. 0.6 km ___ 60 m
28. 500 mm ___ 50 cm
29. 2.3 m ___ 230 mm
30. 3.01 cm ___ 301 mm
31. 586 mm ___ 5.86 cm
32. 0.25 km ___ 250 cm
33. 0.111 km ___ 1,110 cm
34. 8 km ___ 800 dam
35. 0.19 dm ___ 0.19 m
36. 24 m ___ 2,400 dm

Apply

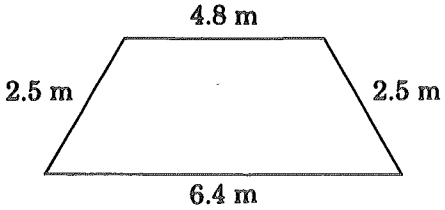
Solve these problems.

37. Jackie ran in a 10,000-meter race. How many kilometers did Jackie run?

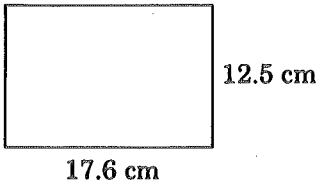
38. Nat's kite has a tail 1.5 times longer than Bill's kite. If the tail on Bill's kite is 3.6 meters long, how many centimeters long is the one on Nat's kite?

Find the perimeter.

39.



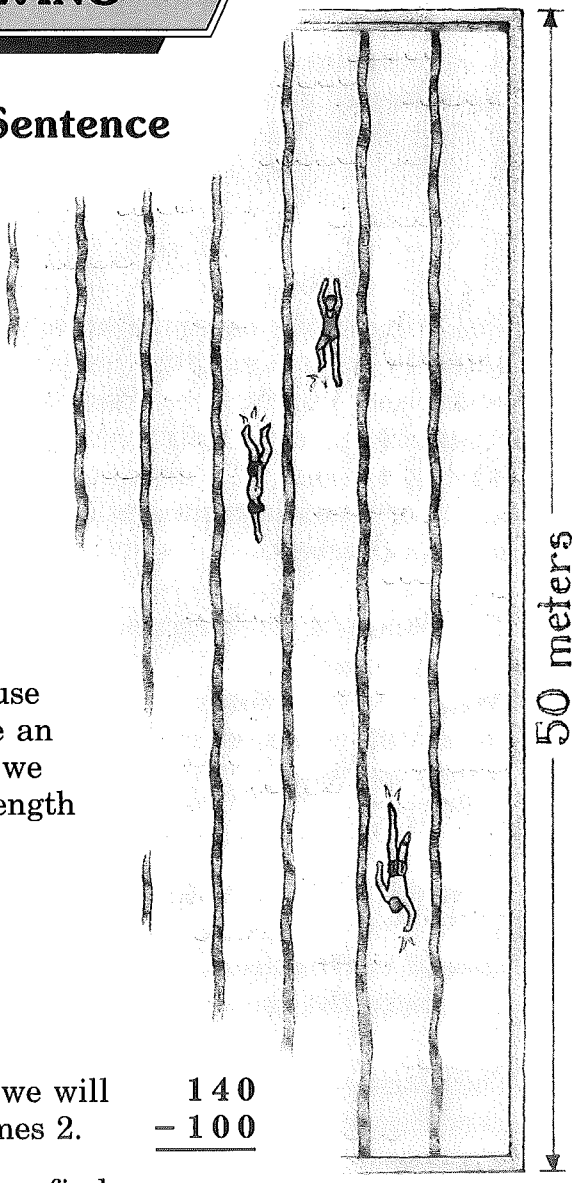
40.



PROBLEM SOLVING

Using a Formula, Writing an Open Sentence

A rectangular swimming pool has a 140-meter perimeter. What is the area of the pool if it is 50 meters long?



★ SEE

We want to know the area of the swimming pool.

The perimeter of the pool is _____ meters.

The length of the pool is _____ meters.

★ PLAN

We need to know the width to find the area. We use the formula for finding perimeter to help us write an open sentence to find the width of the pool. Once we know the width, we can then multiply it by the length to find the area of the pool.

★ DO

(Length × 2) + (Width × 2) = Perimeter
(50 × 2) + (Width × 2) = 140
(100) + (Width × 2) = 140

Since we are missing an addend in this example, we will need to subtract to find the value of the width times 2.

$$\begin{array}{r} 140 \\ -\,100 \\ \hline \end{array}$$

The width doubled is _____, so by dividing by 2 we find the measure of one width.

Length × Width = Area

50 × _____ = _____
The area of the pool is _____ square meters.

★ CHECK

We can check our work by substituting the actual length and width in the perimeter and area formulas.

(2 × Length) + (2 × Width) = Perimeter

(2 × 50) + (2 × _____) = ?

_____ + _____ = _____

Length × Width = Area

50 × _____ = _____

Apply

Use a formula or write an open sentence to help solve these problems.

1. A rectangular playground has a perimeter of 200 meters. Its length is 60 meters. What is its width?

2. An equilateral triangle is a triangle having all three sides the same length. Write a formula to find the perimeter of an equilateral triangle. If one side of a equilateral triangle is 18 inches, what is the perimeter?

3. The volume of a rectangular solid is found by multiplying the length, width and height. Determine the volume of a rectangular solid having a length of 5 centimeters, a width of 3 centimeters and a height of 9 centimeters.

4. The volume of a rectangular solid is 1,260 cubic inches. The length of the solid is 18 inches and the width is 7 inches. Write a formula for finding the height and use it to find the missing measurement.

5. The area of a circle can be found by the formula:
Area = 3.14 × radius × radius.
Determine the area of a circle whose radius is 8 inches.

6. A computer floppy disk cover is a square 5.25 inches on a side. The hole in the center has a radius of approximately 0.5 of an inch. Determine the area of the disk cover.

7. Suppose the length of the rectangle in Problem 1 was 50 meters instead of 60 meters. How would this make the rectangle special?

8. A picometer is a metric unit of measure. A picometer is one trillionth of a meter. How does 1 picometer compare to 1 millimeter?

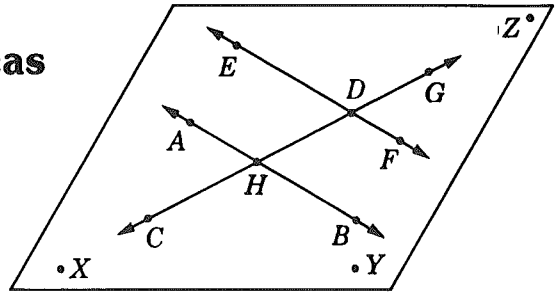
9. The formula for the number of handshakes possible in a group of n people is: $H = \frac{1}{2} \times n \times (n - 1)$. How many handshakes are possible with 5 people? Explain the answer when you try the formula with 1 person.

10. Lois has a garden shaped like a rectangle. The length is a whole number of meters as is the width. The perimeter is 20 meters. What are the possible dimensions of the rectangle?

11 GEOMETRY

Understanding Basic Geometric Ideas

A **plane** is a flat surface that extends forever in all directions. A **point** is any position on the plane. A plane is named by any three of its points. Other basic geometric figures are also named by points they contain.



Plane XYZ

A **line segment** connects two points that are called **endpoints.** If two line segments are the same length, they are **congruent.**

line segment EF ($\overline{EF}$)
line segment FE ($\overline{FE}$)

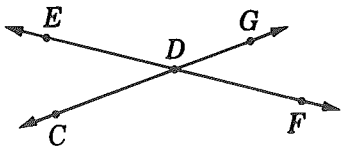
A **line** has no endpoints. It extends forever in opposite directions.

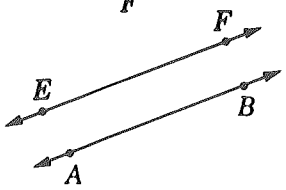
line AB ($\overleftrightarrow{AB}$)
line BA ($\overleftrightarrow{BA}$)

A **ray** is part of a line, with only one endpoint.

ray DF ($\overrightarrow{DF}$)

Some lines intersect or meet. The point of intersection for $\overleftrightarrow{EF}$ and $\overleftrightarrow{CG}$ is point D. If there is no point of intersection, the lines are **parallel.**





$\overleftrightarrow{EF}$ is parallel to $\overleftrightarrow{AB}$.
$\overleftrightarrow{EF} \parallel \overleftrightarrow{AB}$

Getting Started

Name the figure.

1. 

2. 

3. 

Draw and label.

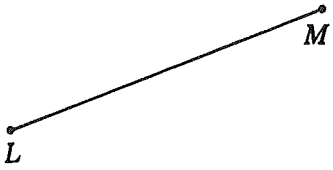
4. Line segment $\overline{ST}$

5. $\overleftrightarrow{AB} \parallel \overleftrightarrow{VW}$

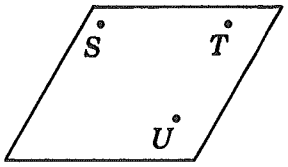
Practice

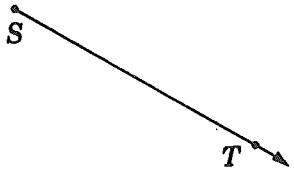
Name the figure.

1. 

2. 

3. 

4. 

5. 

6. 

Draw and label.

7. line XY

8. line segment PQ

9. point P in a plane

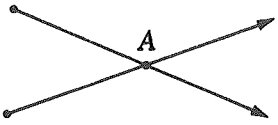
10. $\overleftrightarrow{RT}$ intersecting $\overleftrightarrow{XY}$

11. ray $\overrightarrow{ST}$

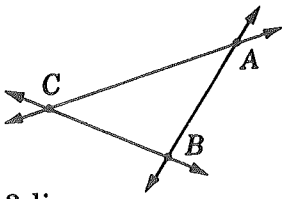
12. $\overleftrightarrow{RS} \parallel \overleftrightarrow{MN}$

EXCURSION

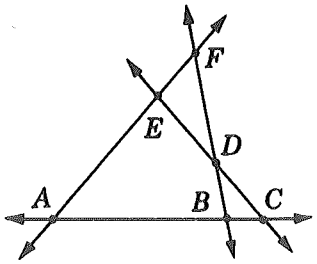
Complete the chart.



2 lines



3 lines

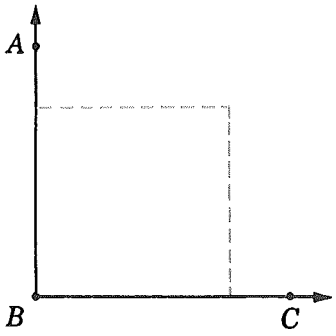


4 lines

Number of Lines	Number of Points of Intersection
2	____
3	____
4	____
5	____
6	____

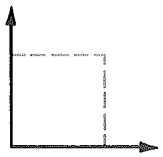
Classifying Angles

An **angle** is formed by two rays with a common endpoint. The rays intersect at the **vertex.** An angle is named with the vertex in the middle. What type of an angle is angle *ABC*?

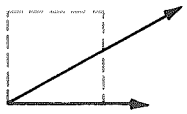


The angle formed can be named:
angle ABC($\angle ABC$)
angle CBA($\angle CBA$)
angle B($\angle B$)

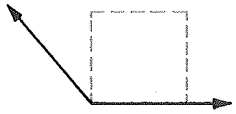
We can use the corner of this page to classify angles.



right angle
90°



acute angle
less than a right angle



obtuse angle
greater than a right angle

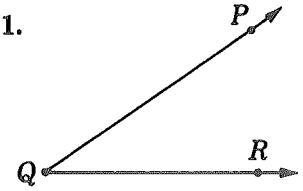
straight angle
two right angles

Angle *ABC* is a _____ angle.

Getting Started

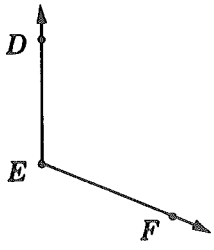
Name each angle three different ways. Name the rays and vertex. Classify each angle.

1.



2.

3.



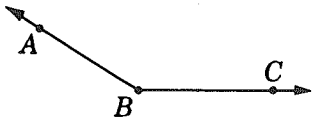
_____ _____ _____

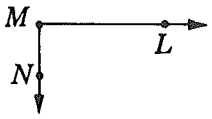
_____ _____ _____

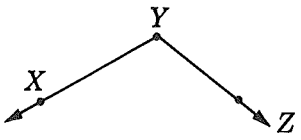
_____ _____ _____

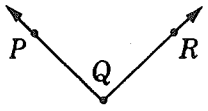
Practice

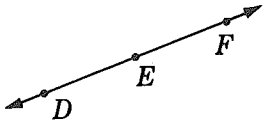
Name each angle three different ways. Name the rays and vertex. Classify each angle.

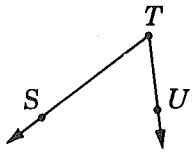
1. 

2. 

3. 

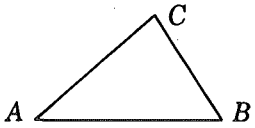
4. 

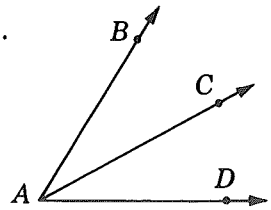
5. 

6. 

Apply

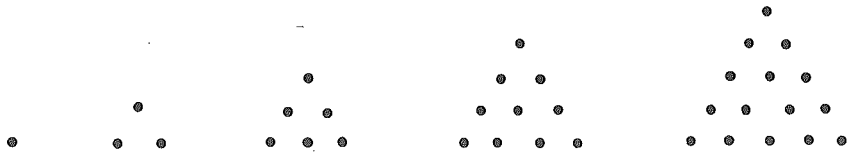
Name three angles in each figure.

7. 

8. 

EXCURSION

Use the pattern to complete the table.



Rows	Dots
1	____
2	____
3	____
4	____
5	____
6	____
10	____

How does the table compare to the one on page 234? _____