

Estimation Strategies

NCTM Standards 1, 6, 7, 8, 9, 10

Use estimation to help you answer these questions.

1 $116 - 58$

- A. 93 C. 38
B. 58 D. 104

2 $179 + 85$

- A. 354 C. 304
B. 204 D. 264

3 23×5

- A. 108 C. 95
B. 115 D. 150

4 $656 \div 8$

- A. 91 C. 82
B. 9 D. 50

5 83×19

- A. 1,063 C. 1,477
B. 1,277 D. 1,577

6 $908 + 86$

- A. 1,194 C. 1,054
B. 994 D. 1,624

7 How many people can sit in a concert hall if there are 57 rows with 79 seats in each row?

- A. 4,003 C. 3,003
B. 4,503 D. 3,503

8 How many buses are needed to transport 4,224 people if each bus can hold 66 people?

- A. 81 C. 64
B. 54 D. 51

Refer to the inventory list to answer the following questions.

6 boxes of shorts

18 boxes of laces

7 boxes of sweatshirts

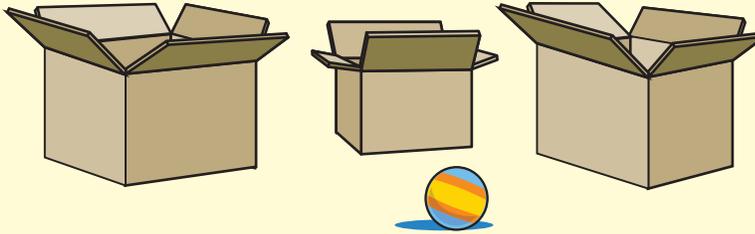
124 pairs of pants

12 boxes of shirts

24 boxes of balls

16 pairs of socks

19 umbrellas



9 If there are 22 shirts per box, how many shirts does the store have?

- A. 200
- B. 204
- C. 324
- D. 264

10 When Jack unpacked the boxes of balls, he had 168 cans of 3 balls. How many cans of balls are in a box?

- A. 15
- B. 7
- C. 25
- D. 21

11 There are 4 shelves for pants. How many pairs of pants should go on each shelf?

- A. 31
- B. 25
- C. 51
- D. 111

12 Jack unpacked the boxes of shorts and put them on 4 shelves. He put 48 shorts on each shelf. How many shorts are in each box?

- A. 26
- B. 52
- C. 32
- D. 42

13 **Challenge** If half a box of sweatshirts has 34 sweatshirts, how many sweatshirts does the store have?

- A. 426
- B. 238
- C. 476
- D. 526

14 **Challenge** If 210 is a third of the store's laces, how many laces are in each box?

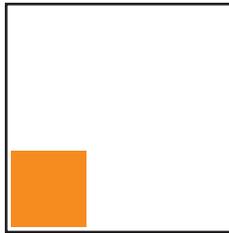
- A. 6
- B. 630
- C. 70
- D. 35

Estimating and Checking Length and Perimeter

NCTM Standards 1, 3, 4, 6, 7, 8, 9, 10

Estimate the perimeter and area of the following shapes.
Use the fact that the area of an orange tile is 1 square centimeter.

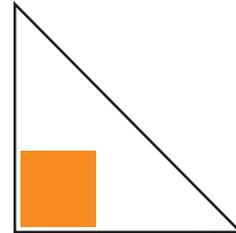
1



The perimeter is about _____ cm.

The area is about _____ sq cm.

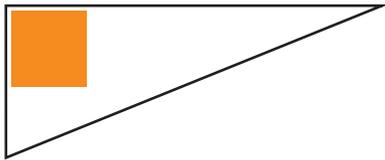
2



The perimeter is about _____ cm.

The area is about _____ sq cm.

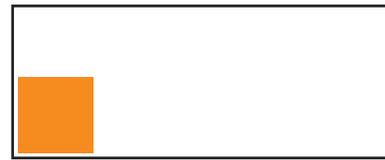
3



The perimeter is about _____ cm.

The area is about _____ sq cm.

4



The perimeter is about _____ cm.

The area is about _____ sq cm.

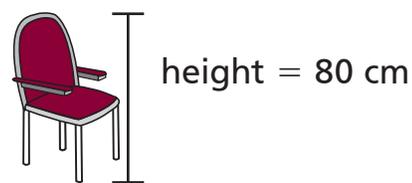
Say whether the given measures are likely or unlikely.

5



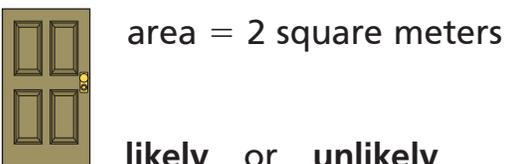
likely or unlikely

6



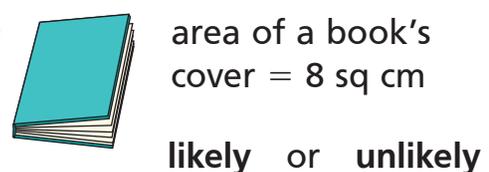
likely or unlikely

7



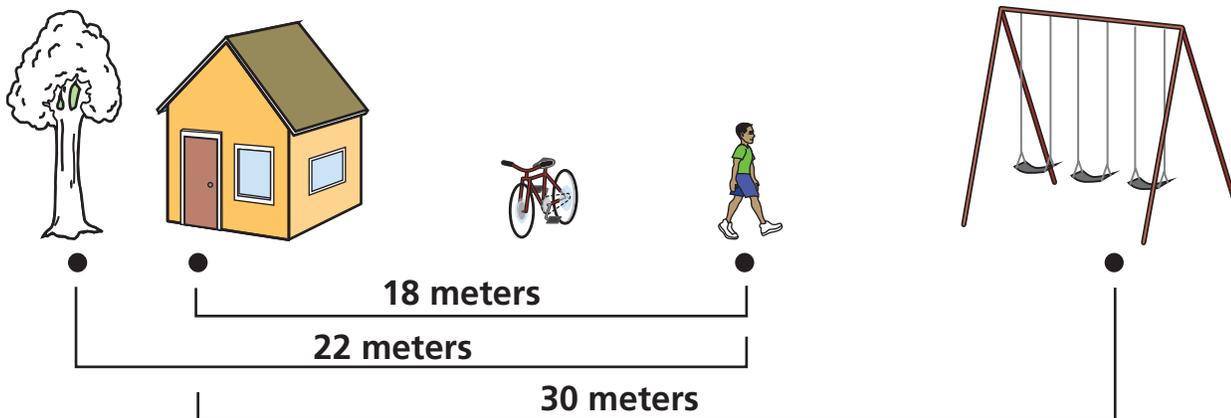
likely or unlikely

8



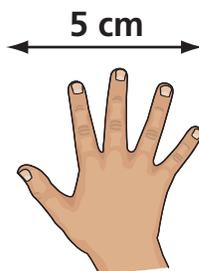
likely or unlikely

Use the picture to answer the questions.



- 9 How far is the student from the swingset? _____ meters
- 10 How far is the tree from the house? _____ meters
- 11 How far is the tree from the swingset? _____ meters
- 12 What can you say about the bicycle's location?

13 Challenge Charlotte used her hand to estimate the perimeter of a drawing. She knows her hand is about 5 cm wide. If she found the perimeter to be 38 hand widths, what is her estimate of the perimeter, in centimeters and meters?

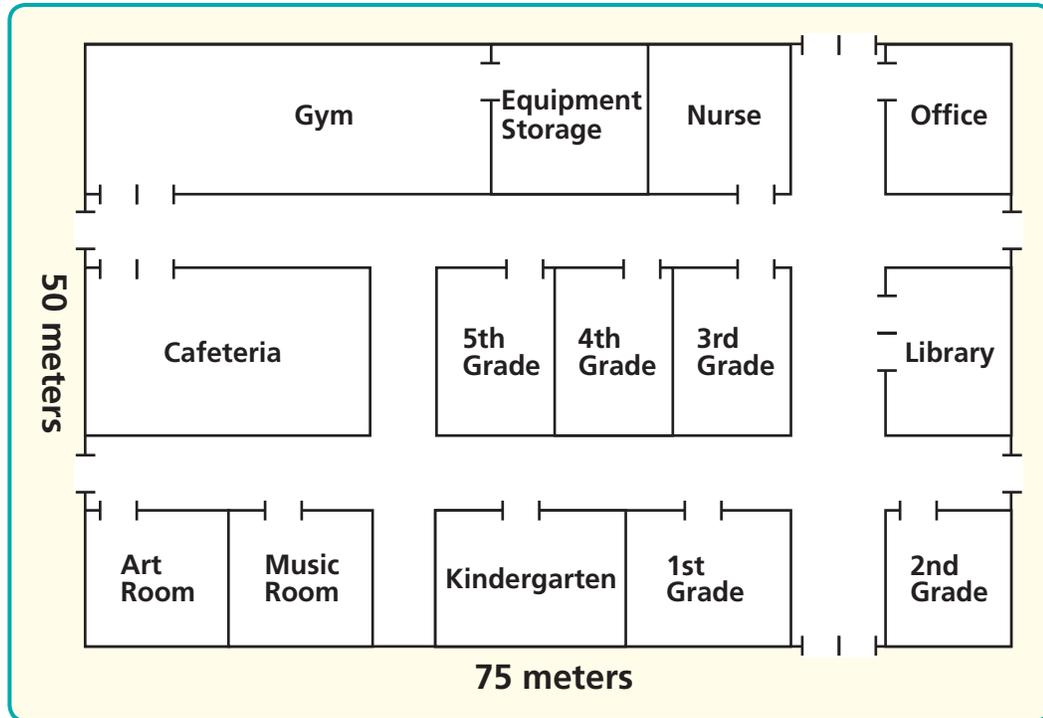


_____ centimeters

_____ meters

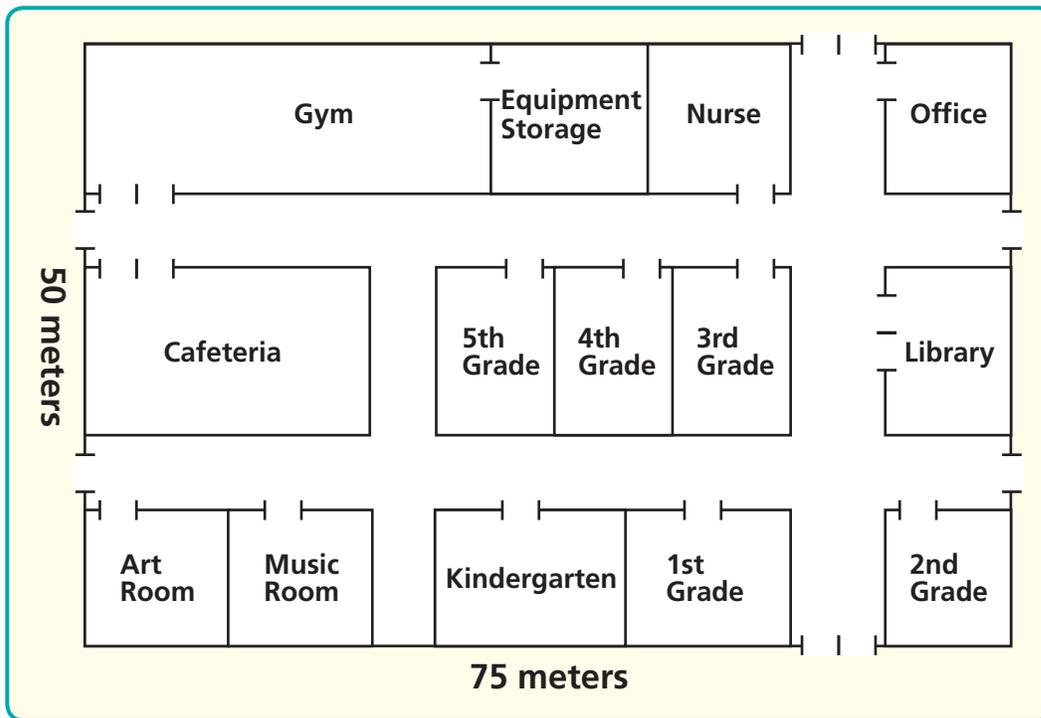
Designing a School

NCTM Standards 1, 3, 4, 6, 7, 8, 9, 10



Use this school's floor plan to answer the questions below.

- Which room has the largest area? _____
- Which grade's classroom has the smallest area? _____
- One wall in the office is 15 meters long and another is 10 meters long. Including the door, what is the office's perimeter? _____ meters
- One wall of the cafeteria is 20 meters long and another is 15 meters long. What is the area of the cafeteria's floor? _____ sq m
- The back wall of the 3rd, 4th, and 5th grade classrooms is actually one long 35-meter wall. The side walls are each 15 meters long. Approximate the area of the 5th grade classroom's floor. about _____ sq m
- Approximate the perimeter of the 4th grade classroom. about _____ meters



This year, the kindergarten class has many more students than the 1st grade class, so the wall separating the two classes is being moved 5 meters to make the kindergarten classroom bigger. The classrooms were the same size to begin with.

- 7 If the old perimeter of the kindergarten classroom was 55 meters, what is the new perimeter? _____ meters
- 8 What is the new perimeter of the first grade class room? _____ meters
- 9 The long wall in the kindergarten classroom is now 22.5 meters in length. What is the new area of the floor of the kindergarten classroom? _____ sq m
- 10 What is the new area of the floor of the first grade classroom? _____ sq m

11 Challenge Estimate the total perimeter of all the hallways. _____ meters

12 Challenge Estimate the total area of the floor space of all the hallways. _____ sq m

Estimating and Checking Capacity

NCTM Standards 1, 4, 6, 7, 8, 9, 10

How can you use these containers to measure the amounts given in Problems 1–2?

1 $7\frac{1}{2}$ liters

a 3-liter jug
 an 8-liter bucket
 a 330-milliliter can
 a $1\frac{1}{2}$ -liter bottle

2 1 liter

How can you use these containers to measure the amounts given in Problems 3–4?

3 $1\frac{1}{2}$ quarts

a 1-gallon container
 a 12-ounce can ($1\frac{1}{2}$ cups)
 a quart container

4 4 ounces ($\frac{1}{2}$ cup)

Say whether the estimated capacity of each object is reasonable. If it is not, give a reasonable estimate.

5



The bucket's capacity is about 5 gallons.

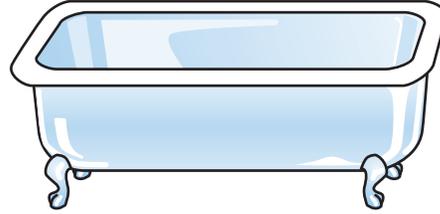
Is this a reasonable estimate?

yes no

If not, what's a reasonable estimate?

about _____ gallons

6



The tub's capacity is about 5 liters.

Is this a reasonable estimate?

yes no

If not, what's a reasonable estimate?

about _____ liters

7



The glass's capacity is about 20 ounces.

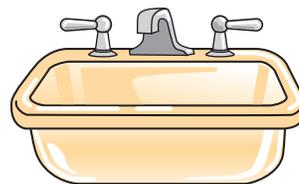
Is this a reasonable estimate?

yes no

If not, what's a reasonable estimate?

about _____ ounces

8



The sink's capacity is about $1\frac{1}{2}$ quarts.

Is this a reasonable estimate?

yes no

If not, what's a reasonable estimate?

about _____ quarts



9 Challenge Give an example of a container with a capacity of about 1 pint.

Comparing Units of Capacity

NCTM Standards 1, 4, 6, 7, 8, 9, 10

Use estimation to help you compare these capacities.

1 18×16 gallons 19×16 gallons

2 67×8 cups 66×4 pints

3 74×19 liters 74×19 quarts

4 83×4 quarts 87×1 gallon

5 38×27 pints 38×14 quarts

6 22×82 cups 21×22 quarts

Answer the questions.

- 7 The soccer coach brought 2 gallons of water to the game and the assistant coach brought 1 gallon of fruit juice. The drinks were shared equally among the 24 kids on the team. How many cups could each player have?

- 8 Before driving 456 miles to grandpa's house, Jen's mom filled the car with gas. The car holds 18 gallons of gas. If the car uses 10 gallons to go 240 miles, will Jen's mom need to fill the car with gas again during the drive? If so, how much more gas will she need? If not, how much will they have left in the tank?

Compare. Use $<$, $>$, or $=$.

9 $\frac{1}{2}$ gallon 2 pints

10 1.1 gallon 4 quarts

11 4.5 quarts $\frac{3}{4}$ gallon

12 $\frac{10}{10}$ pints 10 cups

13 $\frac{7}{8}$ gallon 10 cups

14 3 liters 2 quarts

15 5 cups $2\frac{1}{2}$ pints

16 4 pints $3\frac{1}{2}$ liters

17 1.7 liters 5.07 cups

18 $\frac{3}{4}$ cup $\frac{3}{4}$ pint

19 7.5 cups $\frac{6}{12}$ gallon

20 987.5 ml $\frac{1}{2}$ gallon

21 $\frac{5}{6}$ quart 0.5 liter

22 24 cups 1.5 gallons

23 Challenge Fill in the blanks to make the statements true.

$67 \times \underline{\hspace{2cm}} \text{ cups} = 8 \text{ quarts} \times 67$

$2.5 \text{ pints} \times 17 = \underline{\hspace{2cm}} \text{ cups} \times 17$

$\frac{1}{2} \text{ gallon} + 2 \text{ cups} = \underline{\hspace{2cm}} \text{ pints} + 1 \text{ cup}$

$\frac{9}{10} \text{ pint} > \underline{\hspace{2cm}} \text{ cups}$

Estimating and Checking Weight

NCTM Standards 1, 4, 6, 7, 8, 9, 10

Answer the questions.

- 1 An elevator can hold 2,000 kilograms. An average adult weighs 64 kilograms. About how many people can go on an elevator at once?

about _____ people

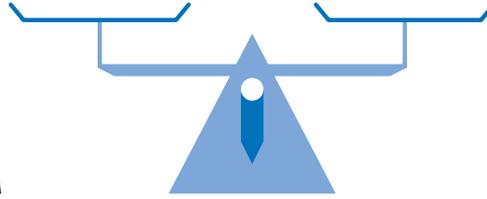
- 2 The Ramon family is moving to another country. They will ship all of their belongings on a boat. The cargo space they are renting can hold 1,000 kilograms. They have 4 beds that each weigh 50 kilograms, 4 sofas that each weigh 55 kg, 4 dressers that each weigh 60 kg, and a table and chairs that weigh 112 kg. About how much more weight can they ship?

about _____ kg

- 3 The second floor of a factory stores boxes that weigh about 15 kg each. The floor can hold 4,590 kg. About how many boxes can be stored on the second floor?

about _____ boxes

How can these weights be used to measure the following weights on a balance scale?



4 4 kg _____



5 14 kg _____



6 3 kg _____



7 10 kg _____



8 **Challenge** Are there any other weights that can be measured with just a balance scale and a 7 kg, an 11 kg, and a 21 kg weight?

Comparing Units of Weight

NCTM Standards 1, 4, 6, 7, 8, 9, 10

Choose the closest weight.**1** A box weighs 3 pounds.

- A. 3 kg C. 6 kg
B. 30 kg D. 1 kg

2 A bicycle weighs 5 kilograms.

- A. 5 lbs C. 10 lbs
B. 50 lbs D. 2 lbs

3 A plate weighs 8 ounces.

- A. 8 kg C. 1 lb
B. 8 g D. 250 g

4 A notebook weighs 15 grams.

- A. 15 oz C. 1 lb
B. $\frac{1}{10}$ lb D. 0.5 kg

5 A mug weighs 350 grams.

- A. 0.35 kg C. 35 kg
B. 3.5 kg D. 350 oz

6 A wood table weighs 20 kilograms.

- A. 2,000 g C. 200,000 g
B. 20,000 g D. 200 g

7 A cell phone weighs 0.25 pounds.

- A. 4 oz C. 12 oz
B. 8 oz D. 16 oz

8 A book weighs 1 kilogram.

- A. 100 g C. 2 lbs
B. 1,000 oz D. 0.5 lbs

9 Put these weights in order from lightest to heaviest.

1 kg 1 ton 2 kg 2 g 2 oz 3 lbs 2 lbs

, , , , , ,

Answer the questions.



10 What are two ways of comparing weights of objects?



11 Can 1 gallon of oil be heavier than 1 gallon of water? Why or why not?



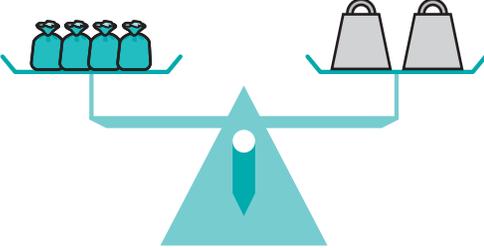
12 **Challenge** Do you think that 1 kilogram of feathers can fit into a 1 gallon jug? Why or why not?

Using Equations to Estimate

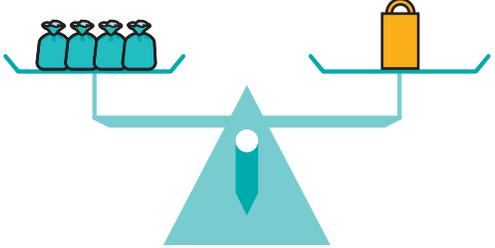
NCTM Standards 1, 2, 4, 6, 7, 8, 9, 10

Using shorthand notation, write an equation to describe each picture.

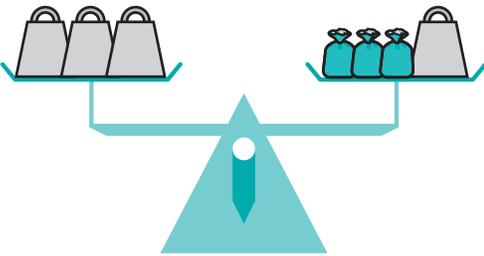
 = 1 kg  = 1 lb

1 

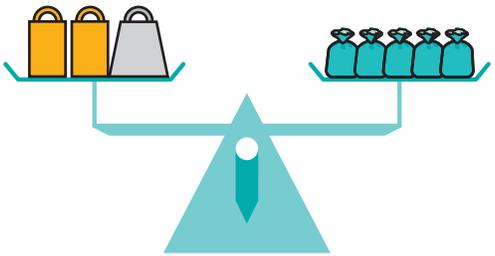
4x = 2 kg

2 

_____ = _____

3 

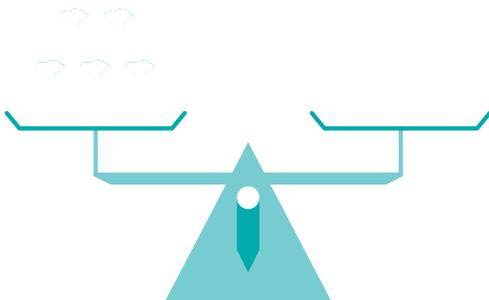
_____ = _____ + _____

4 

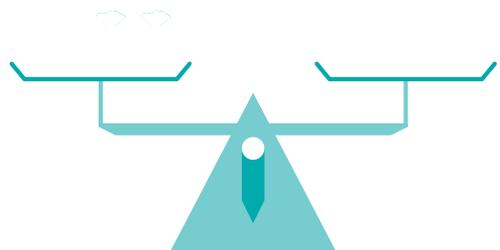
_____ + _____ = _____

Draw a picture to match the equation.

5 $5x = 3 \text{ lb}$



6 $2x + 1 \text{ lb} = 5 \text{ kg}$



Complete the number sentences.

7

$$\underline{\hspace{2cm}} \text{ g} = 1 \text{ kg}$$

8

$$\underline{\hspace{2cm}} \text{ oz} = 1 \text{ lb}$$

9

$$\underline{\hspace{2cm}} \text{ oz} = 5 \text{ lb}$$

10

$$\underline{\hspace{2cm}} \text{ g} = \frac{1}{2} \text{ kg}$$

What is x ?

11 $x + 750 \text{ g} = 1 \text{ kg}$

$$x = \underline{\hspace{2cm}}$$

12 $1 \text{ lb} - x = 12 \text{ oz}$

$$x = \underline{\hspace{2cm}}$$

13 $3 \text{ kg} = x + 2,000 \text{ g}$

$$x = \underline{\hspace{2cm}}$$

14 $3 \text{ oz} + x = 2 \text{ lb}$

$$x = \underline{\hspace{2cm}}$$

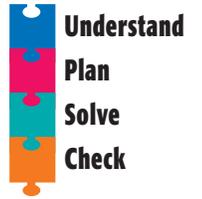


15 **Challenge** 9 bags weigh 5 kg, and 13 boxes weigh 6 kg. Which is heavier, a bag or a box? Explain your answer.

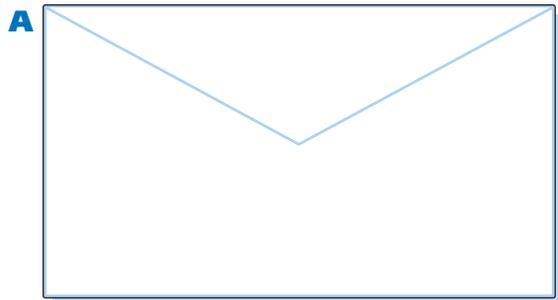
Problem Solving Strategy

Act It Out

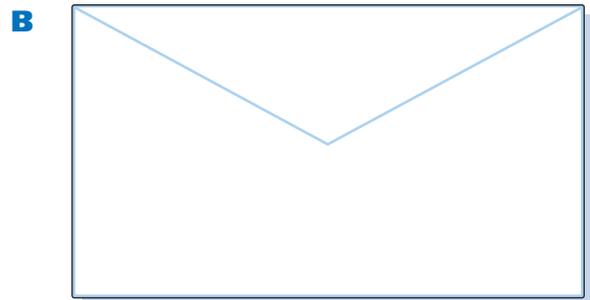
NCTM Standards 1, 2, 4, 6, 7, 8, 9, 10



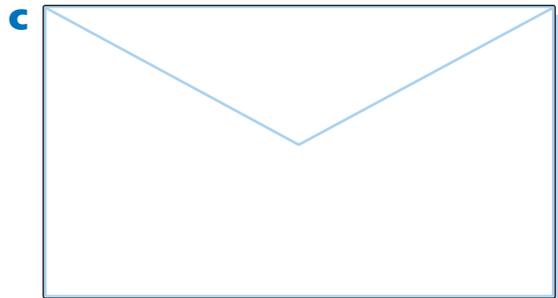
- 1 Xavier has several 3¢ stamps and 7¢ stamps in his desk drawer. He has weighed several letters and knows what postage each one needs. Can he use only the stamps he already has and put the exact postage on each letter?



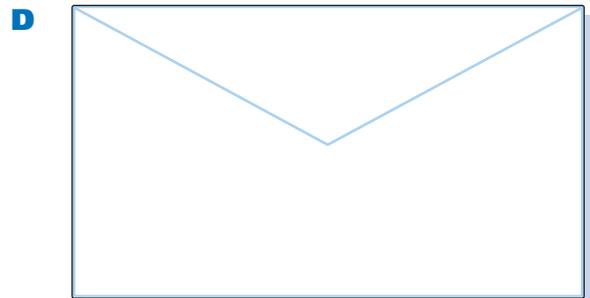
27¢



11¢



30¢



37¢

- 2 Sally is taller than Jake and Laura. Miguel is taller than Jake but shorter than Laura. Selby is shorter than Jake. Robert is taller than Sally. Put these six students in order from shortest to tallest.

, , , , ,

Problem Solving Test Prep

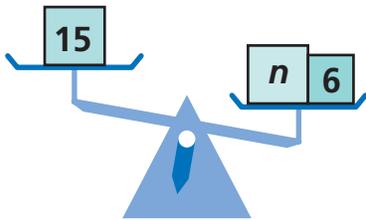
Choose the correct answer.

- 1 The value of 18×18 is 324.

Which expression has a product that is the same as $(324 - 1)$?

- A. 17×19 C. 18×19
B. 17×18 D. 16×20

- 2 Which CANNOT be the value for the variable n ?



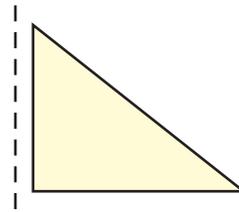
- A. 9
B. 10
C. 15
D. 21

- 3 Choose the best estimate.

$$9 \overline{)741}$$

- A. 60 C. 80
B. 70 D. 90

- 4 Which statement is NOT true of the reflection of the triangle over the line?



- A. It is congruent to the original.
B. It faces the opposite direction of the original.
C. It is a right triangle.
D. It is the same shape but larger than the original.

Show What You Know

Solve each problem. Explain your answer.

- 5 Evan has several 3-pound and 5-pound weights. Can he use a balance scale to show all whole-number weights between 15 and 20 pounds? Explain.

- 6 Corey has 20 small cubes. What is the least number of additional cubes he needs to build a larger cube that uses all the small cubes? Explain.

Use estimation to find the answer. **Lesson 1**

1 $267 + 843$

- A. 1,010 C. 1,110
B. 1,210 D. 1,020

2 $911 - 365$

- A. 696 C. 646
B. 546 D. 596

3 37×22

- A. 814 C. 1,014
B. 614 D. 684

4 $324 \div 9$

- A. 51 C. 45
B. 25 D. 36

5 The orange square is 1 sq cm. **Lesson 2**

Perimeter:

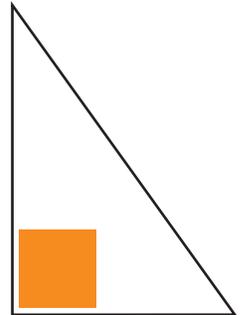
- A. 14 cm
B. 25 cm
C. 26 cm
D. 50 cm



6 The orange square is 1 sq cm. **Lesson 2**

Area:

- A. 24 sq cm
B. 18 sq cm
C. 12 sq cm
D. 6 sq cm



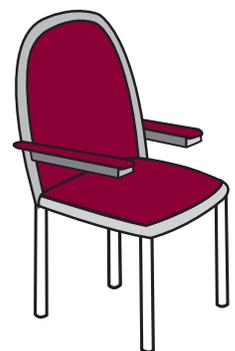
7 Capacity: **Lesson 4**

- A. 1 gallon
B. 8 ounces
C. 3 quarts
D. 1 liter



8 Weight: **Lesson 6**

- A. 0.25 tons
B. 15 kilograms
C. 8 pounds
D. 2 grams



Compare. Use $>$, $<$, or $=$. Hint: Use estimation. Lessons 5 and 7

9 $28 \text{ gallons} \times 9$ $28 \text{ cups} \times 16$

10 $54 \text{ cups} \times 27$ $27 \text{ pints} \times 54$

11 $33 \text{ quarts} \times 42$ $66 \text{ pints} \times 33$

12 $81 \text{ cups} \times 17$ $22 \text{ quarts} \times 18$

13 $55 \times 12 \text{ liters}$ $55 \times 12 \text{ quarts}$

14 $19 \text{ liters} \times 52$ $18 \times 52 \text{ quarts}$

15 $24 \text{ kg} \times 31$ $93 \times 24 \text{ lbs}$

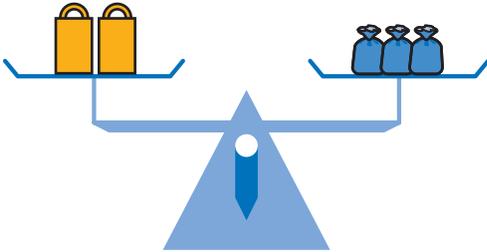
16 $47 \text{ lbs} \times 21$ $25 \text{ kg} \times 21$

17 How can you use 8-inch pencils to estimate the perimeter of a classroom window? What might be a reasonable estimate of the perimeter in feet? Lessons 3 and 9

 = 1 kg  = 1 lb

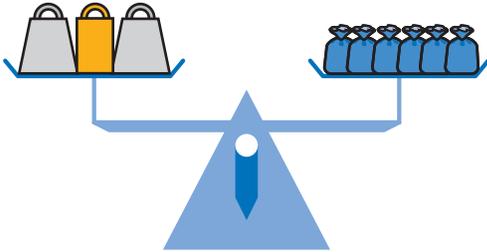
Lesson 8

18



 = 3x

19



1 lb + =