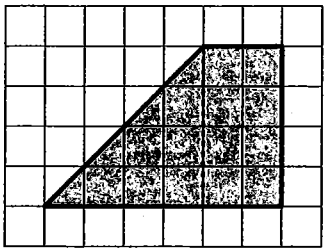
Lesson 7 Practice Problems

Problem 1

To decompose a quadrilateral into two identical shapes, Clare drew a dashed line as shown in the diagram.



a. She said the that two resulting shapes have the same area. Do you agree? Explain your reasoning.

b. Did Clare partition the figure into two identical shapes? Explain your reasoning.

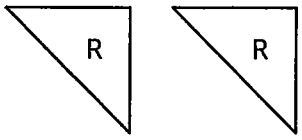
Possible Solutions

a. Yes, the rectangle is 2 units by 4 units, so it has an area of 8 square units. The triangle is half of a 4-by-4 square, so its area is also 8 square units.

b. No, although the shapes have the same area, they are not identical shapes—one is a rectangle and the other a triangle.

Problem 2

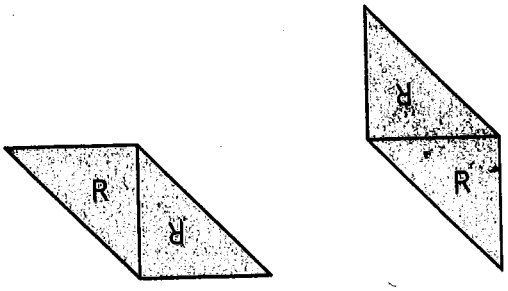
Triangle R is a right triangle. Can we use two copies of Triangle R to compose a parallelogram that is not a square?



If so, explain how or sketch a solution. If not, explain why not.

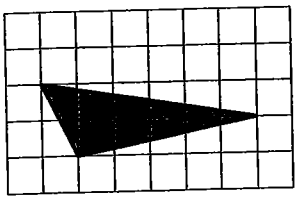
Possible Solutions

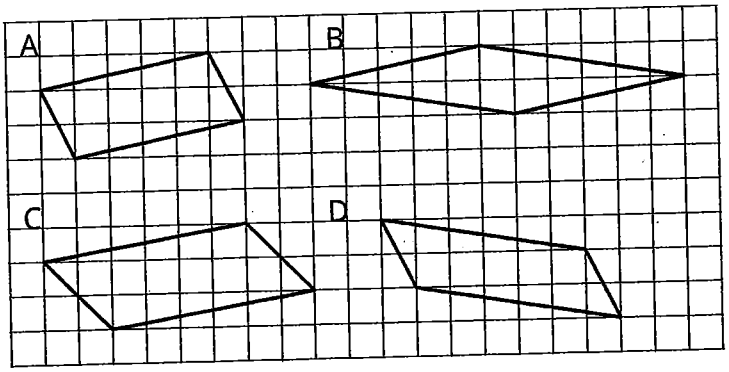
Yes, we can use two right triangles R to compose a parallelogram that is not a square by joining them along one of the shorter sides (the sides that make the right angle).



Problem 3

Two copies of this triangle are used to compose a parallelogram. Which parallelogram *cannot* be a result of the composition? If you get stuck, consider using tracing paper.

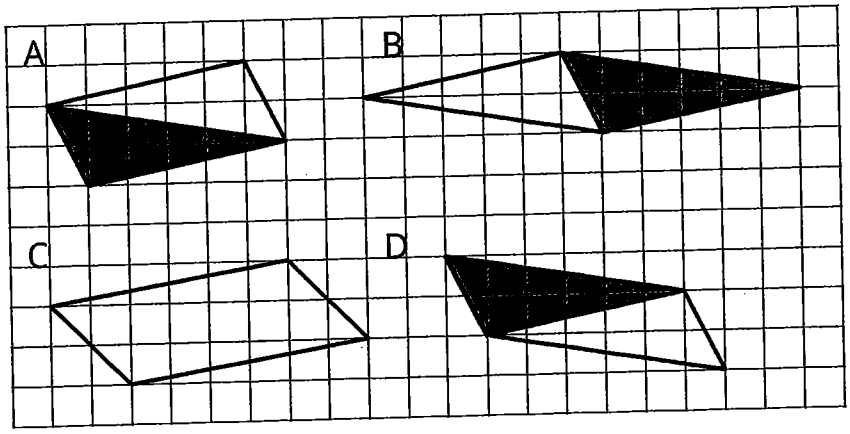




Possible Solutions

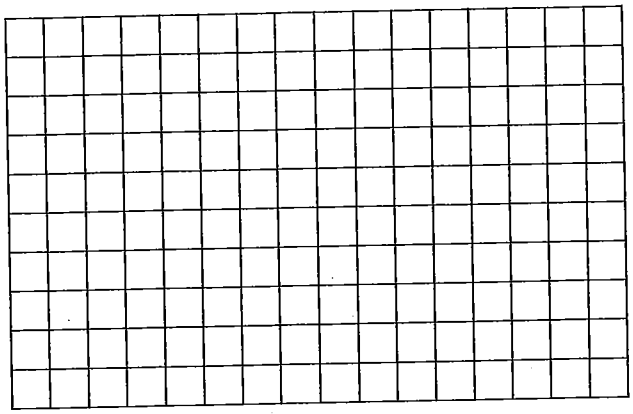
C.

The diagram here shows how the original triangle and its copy can be composed into A, B, and D.



Problem 4

a. On the grid, draw at least three different quadrilaterals that can each be decomposed into two identical triangles with a single cut (show the cut line). One or more of the quadrilaterals should have non-right angles.

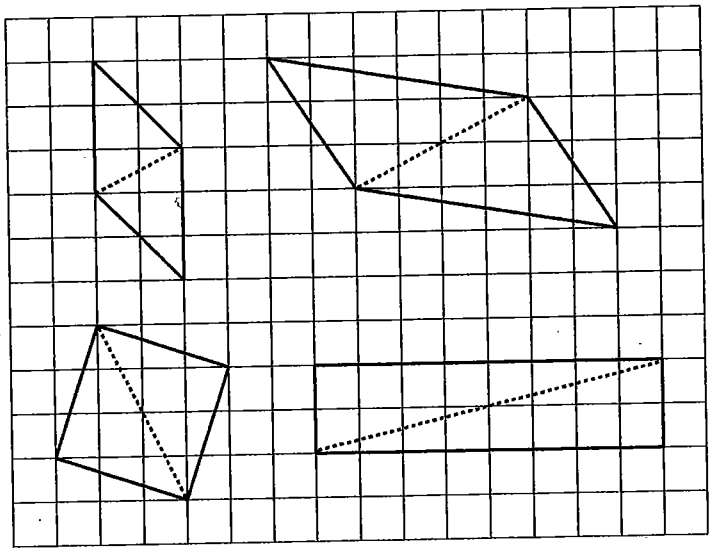


b. Identify the type of each quadrilateral.

Possible Solutions

Answers vary. Sample responses:

a.



b. The top two are parallelograms. The bottom left one is a square. The bottom right one is a rectangle. (All of them are parallelograms.)

Problem 5

From Grade 6, Unit 1, Lesson 6

a. A parallelogram has a base of 9 units and a corresponding height of $\frac{2}{3}$ units. What is its area?

b. A parallelogram has a base of 9 units and an area of 12 square units. What is the corresponding height for that base?

c. A parallelogram has an area of 7 square units. If the height that corresponds to a base is $\frac{1}{4}$ unit, what is the base?

Possible Solutions

a. $\frac{18}{3}$ square units (or equivalent)

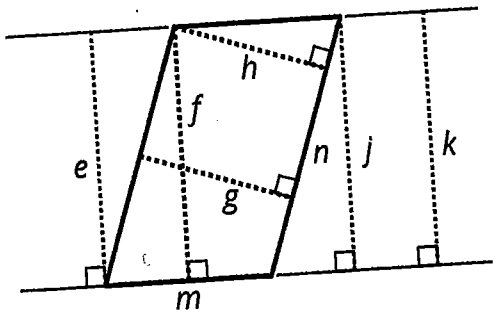
b. $\frac{12}{9}$ units (or equivalent)

c. 28 units

Problem 6

From Grade 6, Unit 1, Lesson 5

Select **all** segments that could represent a corresponding height if the side n is the base.



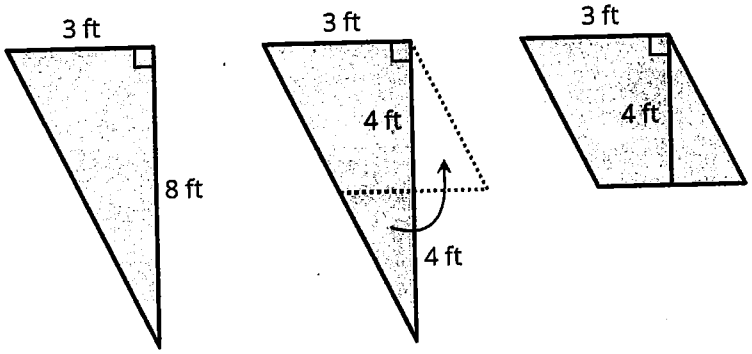
Possible Solutions

g, h

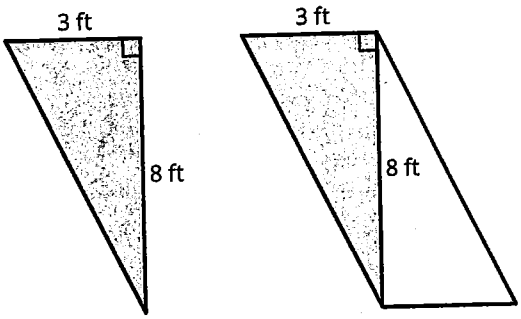
Lesson 8 Practice Problems

Problem 1

To find the area of this right triangle, Diego and Jada used different strategies. Diego drew a line through the midpoints of the two longer sides, which decomposes the triangle into a trapezoid and a smaller triangle. He then rearranged the two shapes into a parallelogram.



Jada made a copy of the triangle, rotated it, and lined it up against one side of the original triangle so that the two triangles make a parallelogram.



a. Explain how Diego might use his parallelogram to find the area of the triangle.

b. Explain how Jada might use her parallelogram to find the area of the triangle.

Possible Solutions

Answers vary. Sample explanations:

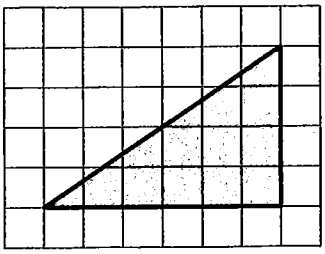
a. Diego's parallelogram has a base of 3 feet and a height of 4 feet, so its area is 12 square feet. Because the original right triangle and the parallelogram are composed of the same parts, they have the same area. The area of the triangle is also 12 square feet.

b. Jada's parallelogram has a base of 3 feet and a height of 8 feet, so its area is 24 square feet. Because it is composed of two copies of the right triangle, she could divide 24 by 2 to find the area of the triangle. $24 \div 2 = 12$ or 12 square feet.

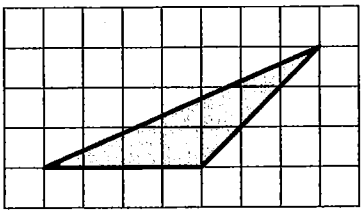
Problem 2

Find the area of the triangle. Explain or show your reasoning.

a.

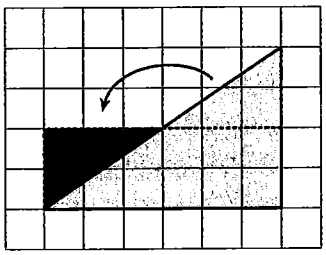


b.



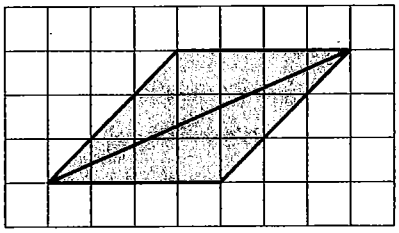
Possible Solutions

a. 12 square units. Reasoning varies. Sample reasoning: Make a horizontal cut, and rearrange the pieces to make a rectangle. The rectangle is 2 units by 6 units, so its area is 12 square units.

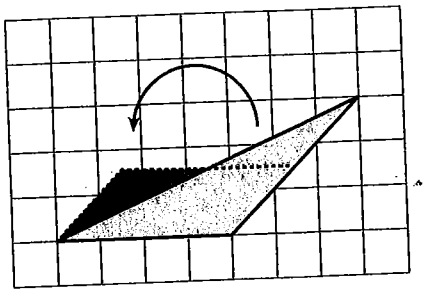


b. 6 square units. Reasoning varies. Sample reasoning:

- Make a horizontal cut, and rearrange the pieces to make a parallelogram. The parallelogram has a base of 4 units and a height of $1\frac{1}{2}$ units, so its area is 6 square units.

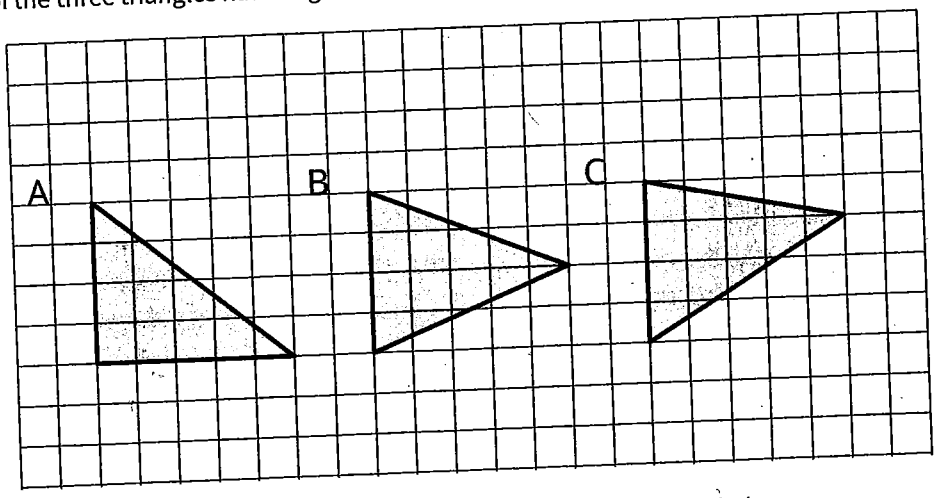


- Decompose the triangle with a cut line half-way between the base and the opposite vertex. Rearrange the smaller triangle to form a parallelogram. This parallelogram has a horizontal base of length 4 units and a height of 1.5 units, so its area is 6 square units. That means the area of the original triangle is 6 square units.



Problem 3

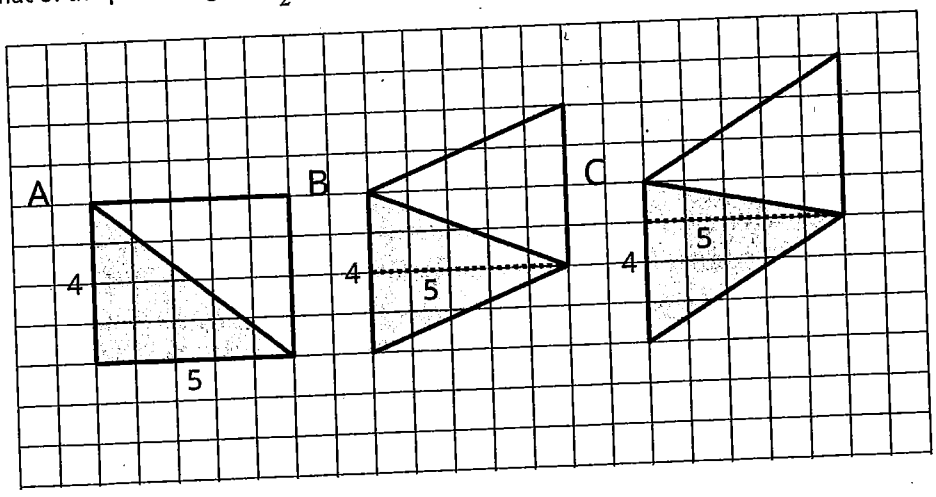
Which of the three triangles has the greatest area? Show your reasoning.



If you get stuck, use what you know about the area of parallelograms to help you.

Possible Solutions

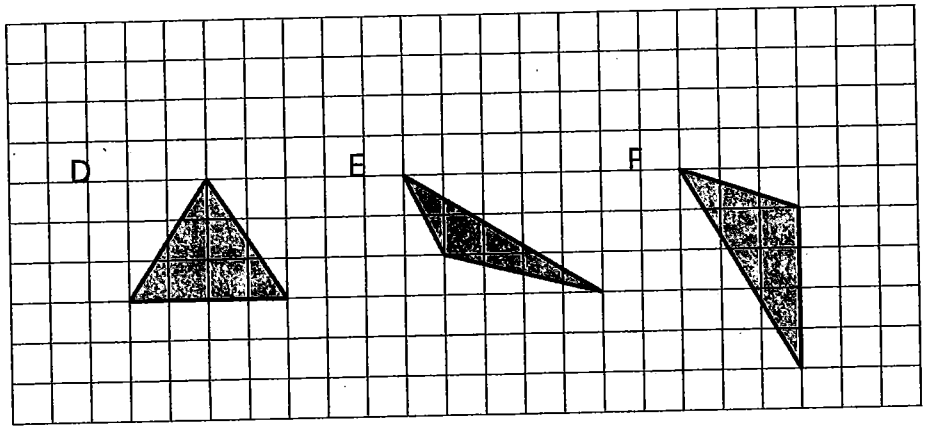
All three triangles have the same area of 10 square units. Reasoning varies. Sample reasoning: Two identical copies of each triangle can be composed into a parallelogram with a base of 5 units and a corresponding height of 4 units, which means an area of 20 square units. The area of each triangle is half of that of the parallelogram. $\frac{1}{2} \cdot 20 = 10$.



Problem 4

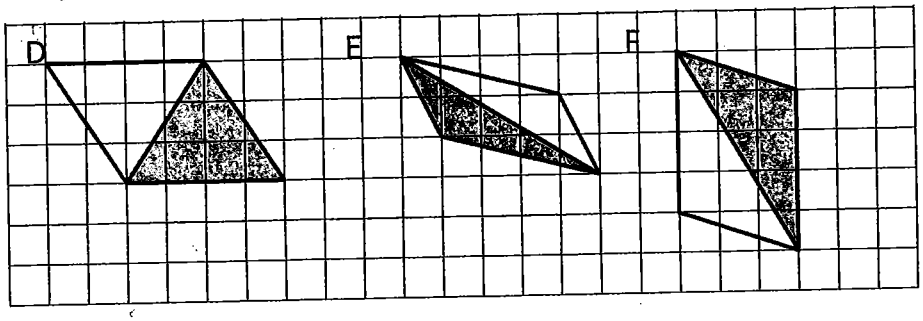
From Grade 6, Unit 1, Lesson 7

Draw an identical copy of each triangle such that the two copies together form a parallelogram. If you get stuck, consider using tracing paper.



Possible Solutions

Answers vary. Sample response:



Problem 5

From Grade 6, Unit 1, Lesson 6

a. A parallelogram has a base of 3.5 units and a corresponding height of 2 units. What is its area?

b. A parallelogram has a base of 3 units and an area of 1.8 square units. What is the corresponding height for that base?

c. A parallelogram has an area of 20.4 square units. If the height that corresponds to a base is 4 units, what is the base?

Possible Solutions

a. 7 square units

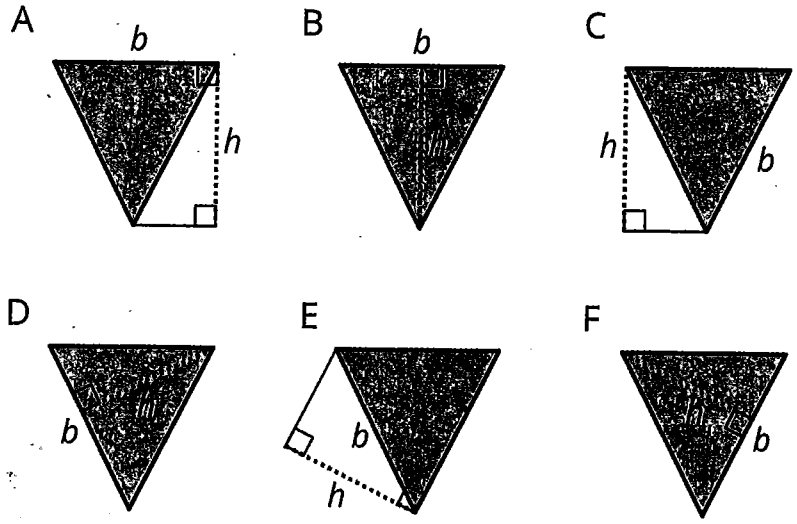
b. 0.6 units

c. 5.1 units

Lesson 9 Practice Problems

Problem 1

Select **all** drawings in which a corresponding height h for a given base b is correctly identified.

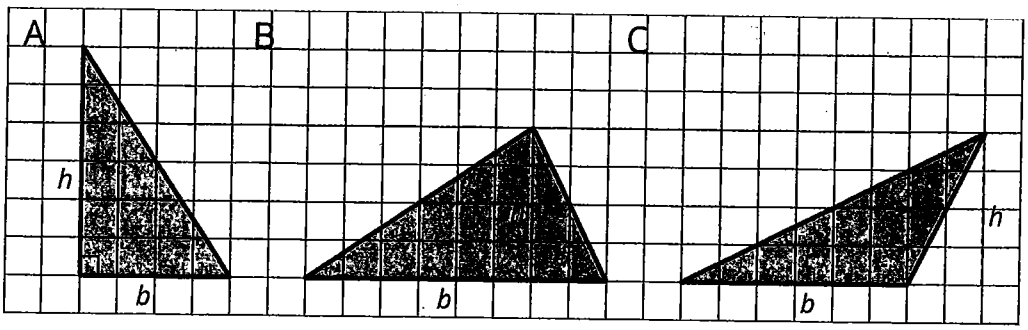


Possible Solutions

A, B, D, F

Problem 2

For each triangle, a base and its corresponding height are labeled.

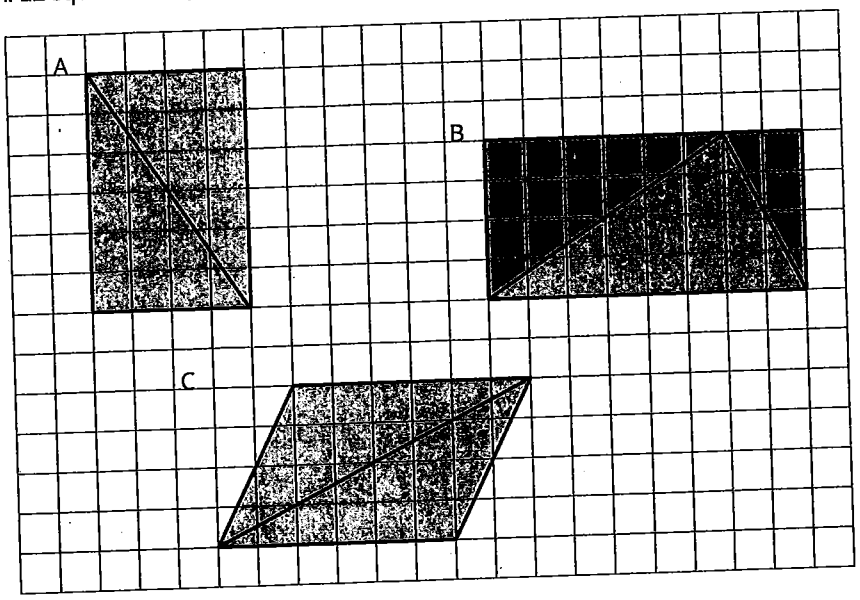


a. Find the area of each triangle.

b. How is the area related to the base and its corresponding height?

Possible Solutions

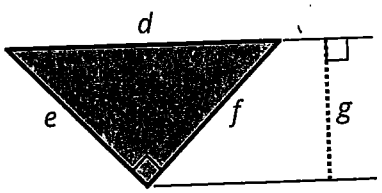
a. Triangle A: 12 square units, Triangle B: 16 square units, Triangle C: 12 square units



b. In each case, the area of the triangle, in square units, is half of the base times its corresponding height, $\frac{b \cdot h}{2}$.

Problem 3

Here is a right triangle. Name a corresponding height for each base.



a. Side d
b. Side e
c. Side f

Possible Solutions

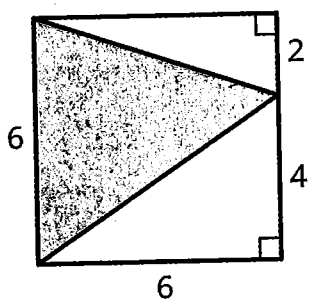
a. Segment g
b. Side f
c. Side e

Problem 4

From Grade 6, Unit 1, Lesson 8

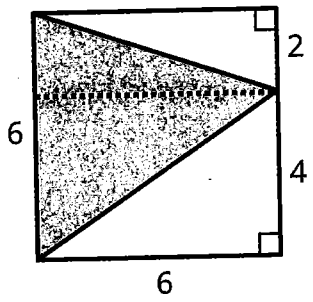
Lesson 9 Practice Problems

Find the area of the shaded triangle. Show your reasoning.



Possible Solutions

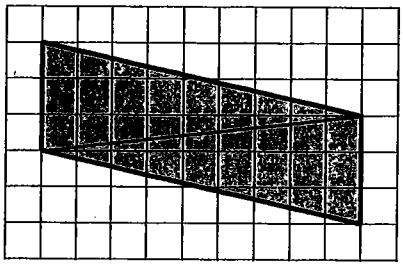
18 square units. Reasoning varies. One likely approach is to decompose the triangle with a horizontal line to form two rectangles and to split the triangle into two smaller triangles. The top triangle is half of the top rectangle, so its area is $\frac{1}{2} \cdot 6 \cdot 2 = 6$. The bottom triangle is half of the bottom rectangle, so its area is $\frac{1}{2} \cdot 6 \cdot 4 = 12$. The area of the original triangle is $6 + 12$ or 18 square units.



Problem 5

From Grade 6, Unit 1, Lesson 7

Andre drew a line connecting two opposite corners of a parallelogram. Select **all** true statements about the triangles created by the line Andre drew.



A. Each triangle has two sides that are 3 units long.

B. Each triangle has a side that is the same length as the diagonal line.

C. Each triangle has one side that is 3 units long.

D. When one triangle is placed on top of the other and their sides are aligned, we will see that one triangle is larger than the other.

E. The two triangles have the same area as each other.

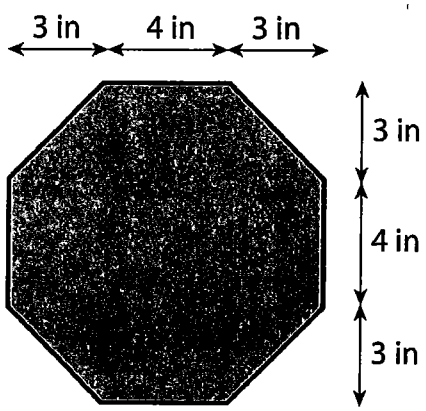
Possible Solutions

B, C, E

Problem 6

From Grade 6, Unit 1, Lesson 3

Here is an octagon.



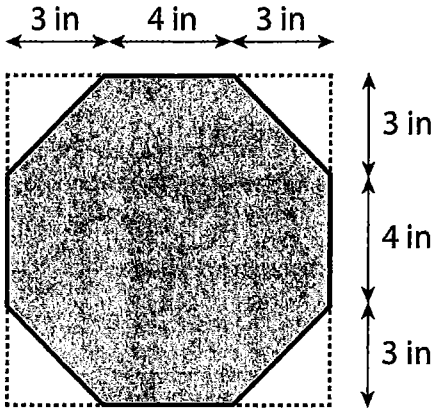
a. While estimating the area of the octagon, Lin reasoned that it must be less than 100 square inches. Do you agree? Explain your reasoning.

b. Find the exact area of the octagon. Show your reasoning.

Possible Solutions

a. Yes. Explanations vary. Sample explanation: The octagon fits in a square that is 10 inches by 10 inches, but with four corners of the square removed. The square has an area of 100 square inches, so the area of the octagon must be less than that.

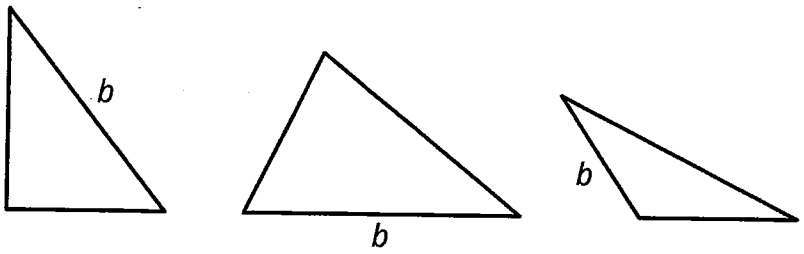
b. 82 square inches. Reasoning varies. Sample reasoning: A 10-inch-by-10-inch square that encloses the octagon has an area of 100 square inches. Two corner triangles compose a 3 inch-by-3 inch square, so their combined area is 9 square inches.
$100 - 2(3 \cdot 3) = 100 - 18 = 82$.



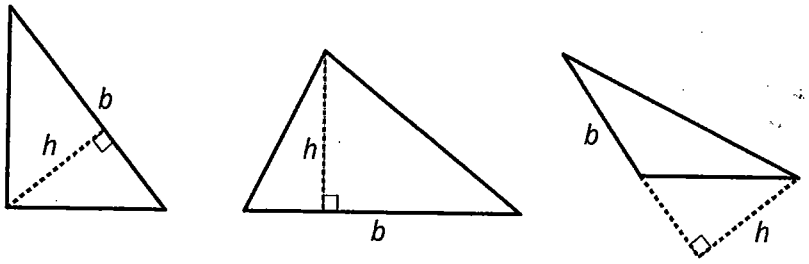
Lesson 10 Practice Problems

Problem 1

For each triangle, a base is labeled b. Draw a line segment that shows its corresponding height. Use an index card to help you draw a straight line.

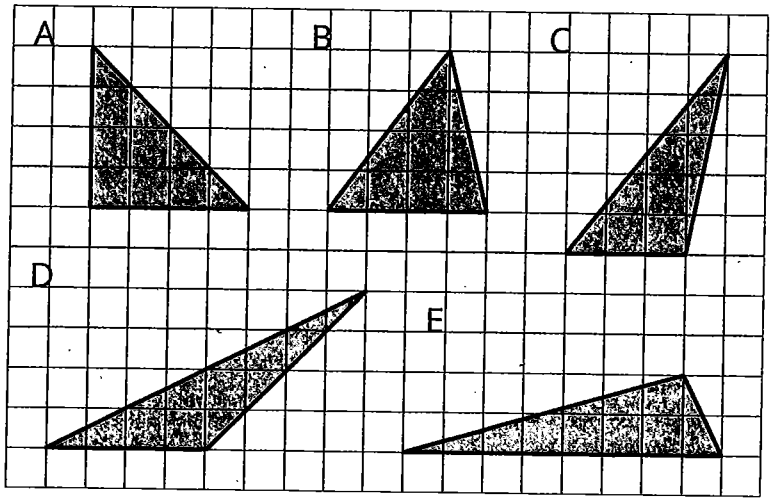


Possible Solutions



Problem 2

Select all triangles that have an area of 8 square units. Explain how you know.

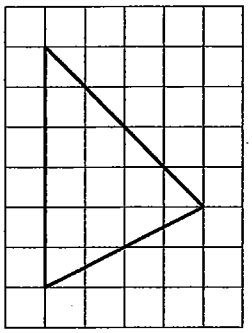


Possible Solutions

A, B, D, and E. Triangles A, B, and D all have a horizontal base of 4 units and a height of 4 units. $\frac{4 \cdot 4}{2} = 8$, so the area of each is 8 square units. Triangle C has a horizontal base of 4 units and a height of 5 units, so its area is 10 square units. Triangle E has a horizontal base of 8 units and a height of 2 units, so its area is 8 square units, since $\frac{8 \cdot 2}{2} = 8$.

Problem 3

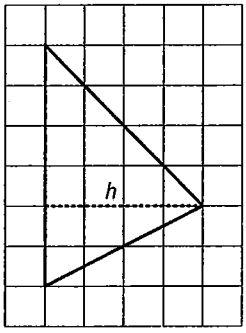
Find the area of the triangle. Show your reasoning.



If you get stuck, carefully consider which side of the triangle to use as the base.

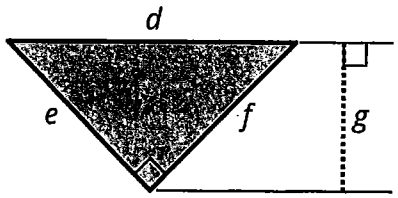
Possible Solutions

12 square units. Explanations vary. Sample response: The vertical side is 6 units long, and this side can be used as the base. The corresponding height, shown in the diagram, is 4 units. So the area is 12 square units. Another method is to surround the triangle with a rectangle then subtract the parts that are not in the triangle.



Problem 4

Can side d be the base for this triangle? If so, which length would be the corresponding height? If not, explain why not.



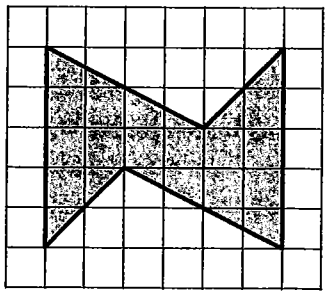
Possible Solutions

Yes, side d can be the base, because it is a side of the triangle. The corresponding height is g.

Problem 5

From Grade 6, Unit 1, Lesson 3

Find the area of this shape. Show your reasoning.



Possible Solutions

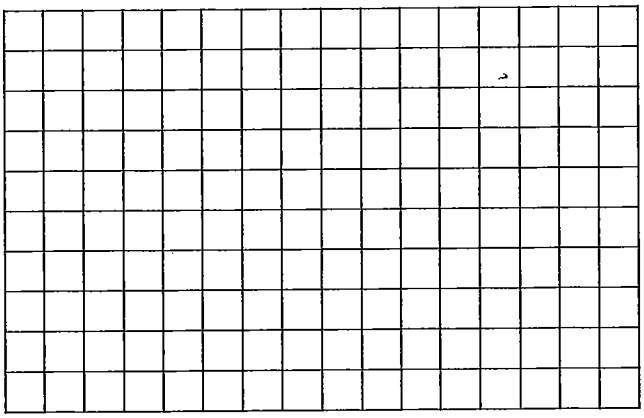
18 square units. Reasoning varies.

Problem 6

From Grade 6, Unit 1, Lesson 6

Lesson 10 Practice Problems

On the grid, sketch two different parallelograms that have equal area. Label a base and height of each and explain how you know the areas are the same.



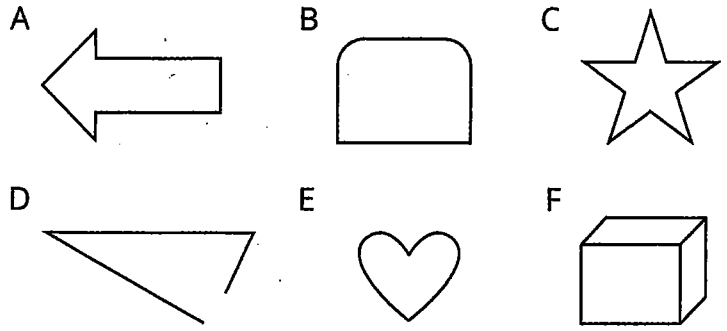
Possible Solutions

Answers vary.

Lesson 11 Practice Problems

Problem 1

Select **all** the polygons.



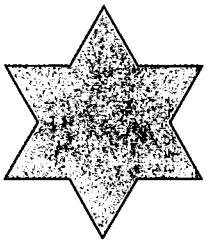
Possible Solutions

A, C. The following figures are not polygons:

- Figure B, because it does not have straight sides
- Figure D, because it is not a closed figure
- Figure E, because it does not have straight sides
- Figure F, because it is a three-dimensional figure

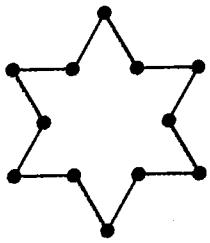
Problem 2

Mark each vertex with a large dot. How many edges and vertices does this polygon have?



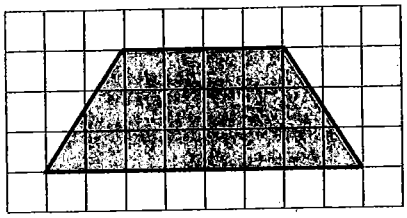
Possible Solutions

12 edges and 12 vertices



Problem 3

Find the area of this trapezoid. Explain or show your strategy.

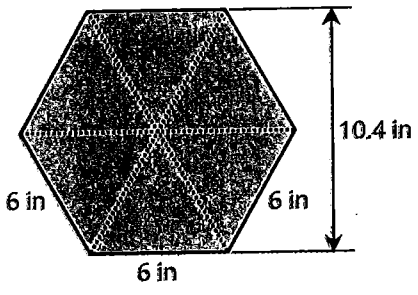


Possible Solutions

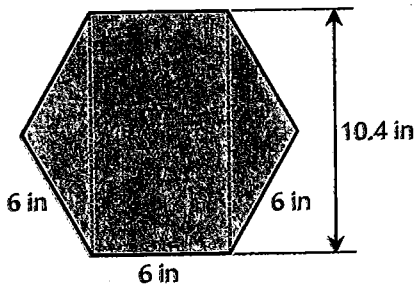
18 square units. Strategies vary. Possible strategy: Enclose the trapezoid inside a 3-unit-by-8-unit rectangle. The area of the rectangle is 24 square units because $8 \cdot 3 = 24$. The area of each unshaded triangle within the rectangle is 3 square units because $(2 \cdot 3) \div 2 = 3$. The sum of areas of the two triangles is 6 square units. $24 - 6 = 18$, so the area of the trapezoid is 18 square units.

Problem 4

Lin and Andre used different methods to find the area of a regular hexagon with 6-inch sides. Lin decomposed the hexagon into six identical triangles. Andre decomposed the hexagon into a rectangle and two triangles.



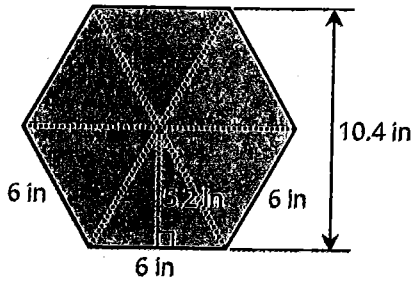
Lin's method



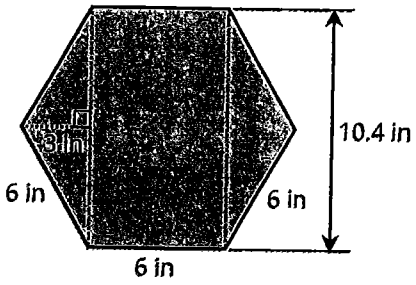
Andre's method

Find the area of the hexagon using each person's method. Show your reasoning.

Possible Solutions



Lin's method



Andre's method

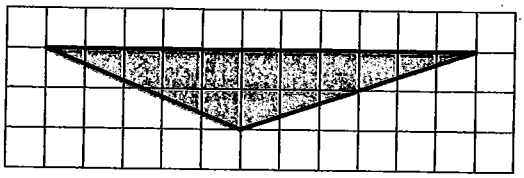
The height of each triangle in Lin's diagram is half of 10.4 inches or 5.2 inches. The area of each triangle is 15.6 square inches. $\frac{1}{2} \cdot 6 \cdot (5.2) = 15.6$. The hexagon is composed of 6 triangles, so its area is $6 \cdot (15.6)$ or 93.6 square inches.

The rectangle in Andre's diagram is $(10.4) \cdot 6$ or 62.4 square inches. Each triangle has a base of 10.4 inches and a height of 3 inches. (The horizontal distance across the middle of the hexagon is composed of two 6-inch segments. The vertical line that Andre drew cuts one 6-inch segment in half, so the segment on one side is 3 inches long.) The area of each triangle is $\frac{1}{2} \cdot 10.4 \cdot 3$ or 15.6 square inches. The area of the hexagon is therefore $62.4 + 15.6 + 15.6$ or 93.6 square inches.

Problem 5

From Grade 6, Unit 1, Lesson 9

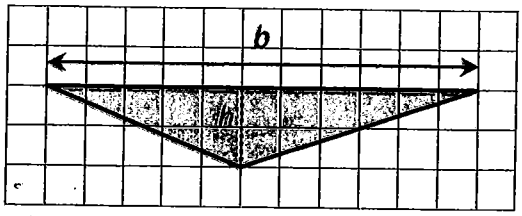
a. Identify a base and a corresponding height that can be used to find the area of this triangle. Label the base b and the corresponding height h.



2. Find the area of the triangle. Show your reasoning.

Possible Solutions

a.

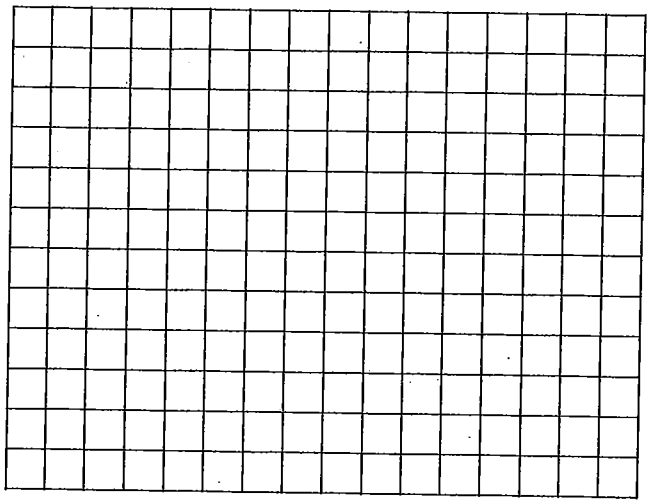


b. 11 square units. $\frac{1}{2} \cdot 11 \cdot 2 = 11$.

Problem 6

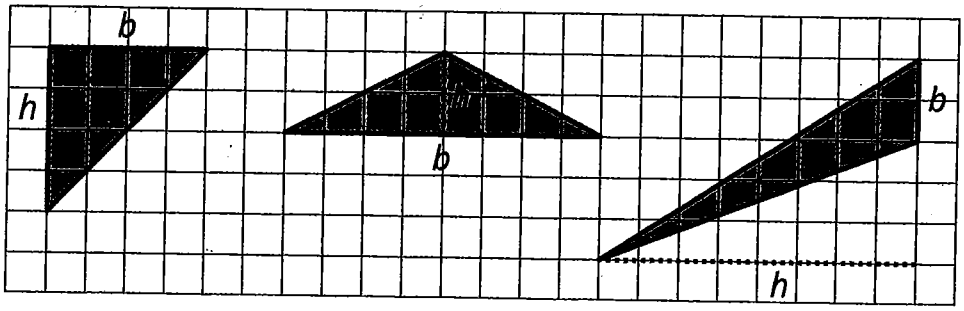
From Grade 6, Unit 1, Lesson 10

On the grid, draw three different triangles with an area of 12 square units. Label the base and height of each triangle.



Possible Solutions

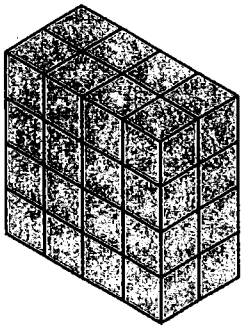
Answers vary. Drawings should show triangles with a base and a height that multiply to be 24 square units (i.e., each triangle is half of a parallelogram with an area of 24 square units).



Lesson 12 Practice Problems

Problem 1

What is the surface area of this rectangular prism?



A. 16 square units
B. 32 square units
C. 48 square units
D. 64 square units

Possible Solutions

D

Problem 2

Which description can represent the surface area of this trunk?

A. The number of square inches that cover the top of the trunk.
B. The number of square feet that cover all the outside faces of the trunk.
C. The number of square inches of horizontal surface inside the trunk.
D. The number of cubic feet that can be packed inside the trunk.

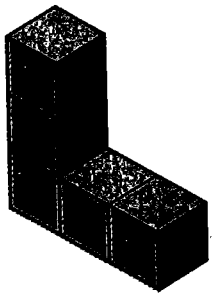
Possible Solutions

B

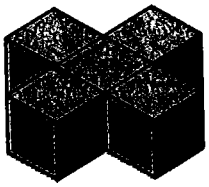
Problem 3

Which figure has a greater surface area?

A



B



Possible Solutions

Figure A and Figure B have the same surface area of 22 square units.

Problem 4

A rectangular prism is 4 units high, 2 units wide, and 6 units long. What is its surface area in square units? Explain or show your reasoning.

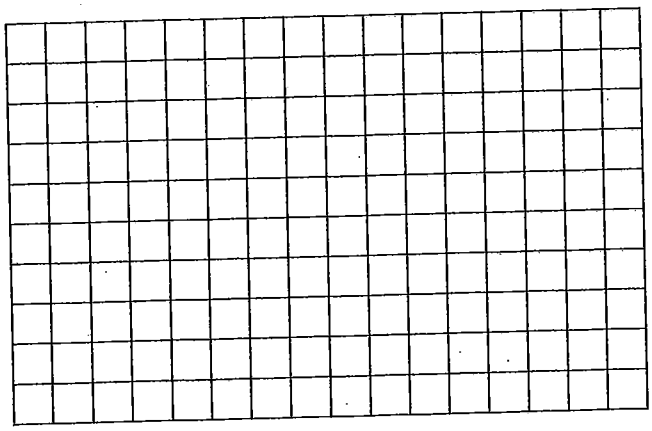
Possible Solutions

88 square units. Two faces are 4 units by 2 units, amounting to 16 square units. Two faces are 4 units by 6 units, amounting to 48 square units. Two faces are 2 units by 6 units, amounting to 24 square units. $16 + 48 + 24 = 88$.

Problem 5

From Grade 6, Unit 1, Lesson 9

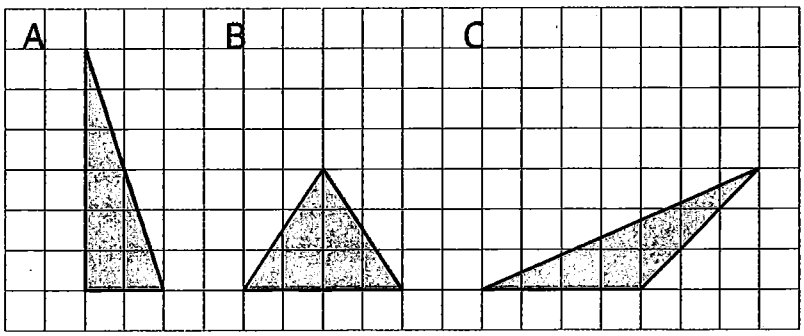
Draw an example of each of the following triangles on the grid.



a. A right triangle with an area of 6 square units.
b. An acute triangle with an area of 6 square units.
c. An obtuse triangle with an area of 6 square units.

Possible Solutions

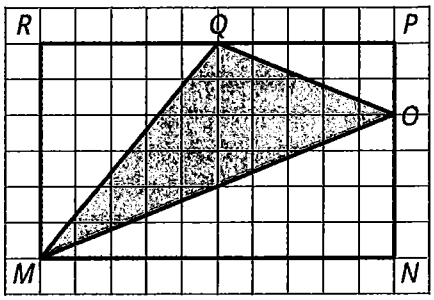
Answers vary. Sample response:



Problem 6

From Grade 6, Unit 1, Lesson 10

Find the area of triangle MOQ in square units. Show your reasoning.



Possible Solutions

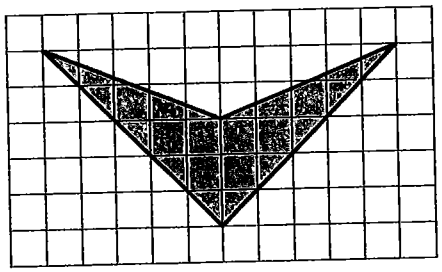
20 square units. Reasoning varies. Sample reasoning: The area of triangle MOQ can be found by subtracting the areas of the three right triangles from the area of rectangle $MNPR$.

- The area of rectangle $MNPR$ is $10 \cdot 6$ or 60 square units.
- The area of triangle QRM is $\frac{1}{2} \cdot 6 \cdot 5$ or 15 square units.
- The area of triangle MNO is $\frac{1}{2} \cdot 10 \cdot 4$ or 20 square units.
- The area of triangle OPQ is $\frac{1}{2} \cdot 2 \cdot 5$ or 5 square units. $60 - (15 + 20 + 5) = 20$.

Problem 7

From Grade 6, Unit 1, Lesson 3

Find the area of this shape. Show your reasoning.



Possible Solutions

15 square units. Reasoning varies. Sample reasoning:

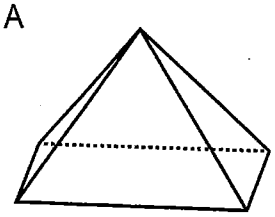
- The shape can be decomposed into two identical triangles with a vertical cut down the middle. Each triangle has base 3 units and height 5 units, so its area is $\frac{1}{2} \cdot 3 \cdot 5$ or 7.5 square units. $2 \cdot (7.5) = 15$.
- The shape can be decomposed into two identical triangles and rearranged into a parallelogram with base 3 units and height 5 units. $3 \cdot 5 = 15$.

Lesson 13 Practice Problems

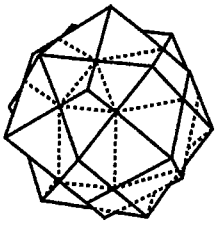
Problem 1

Select **all** the polyhedra.

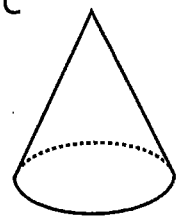
A



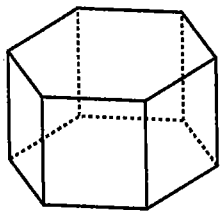
B



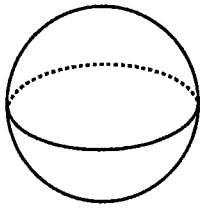
C



D



E



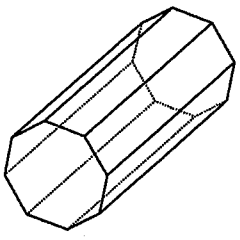
Possible Solutions

A, B, D

Problem 2

a. Is this polyhedron a prism, a pyramid, or neither? Explain how you know.

b. How many faces, edges, and vertices does it have?



Possible Solutions

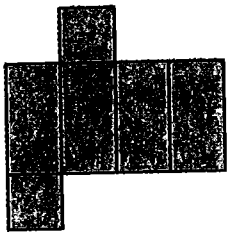
a. Prism. It has two parallel octagonal bases that match up exactly.

b. 10 faces, 24 edges, 16 vertices

Problem 3

Tyler said this net cannot be a net for a square prism because not all the faces are squares.

Do you agree with Tyler's statement? Explain your reasoning.



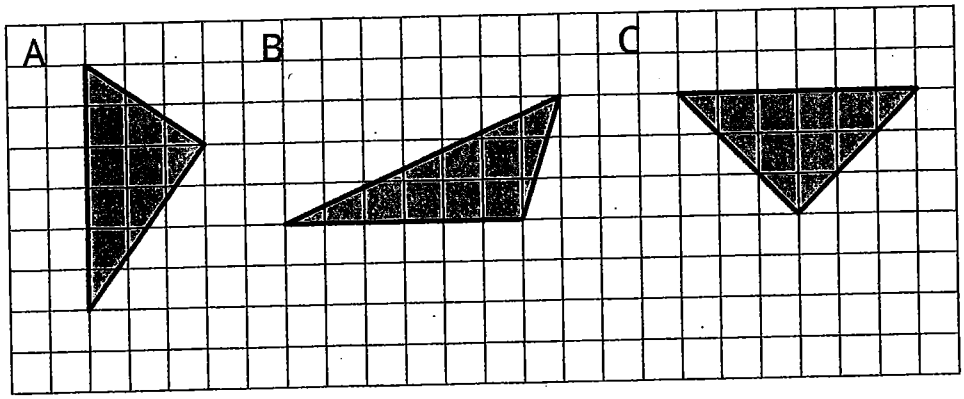
Possible Solutions

Disagree. Sample reasoning: A square prism must have two bases that are squares, but the other faces can be non-square rectangles. There are two squares in the net, and the net can be folded into a square prism.

Problem 4

From Grade 6, Unit 1, Lesson 8

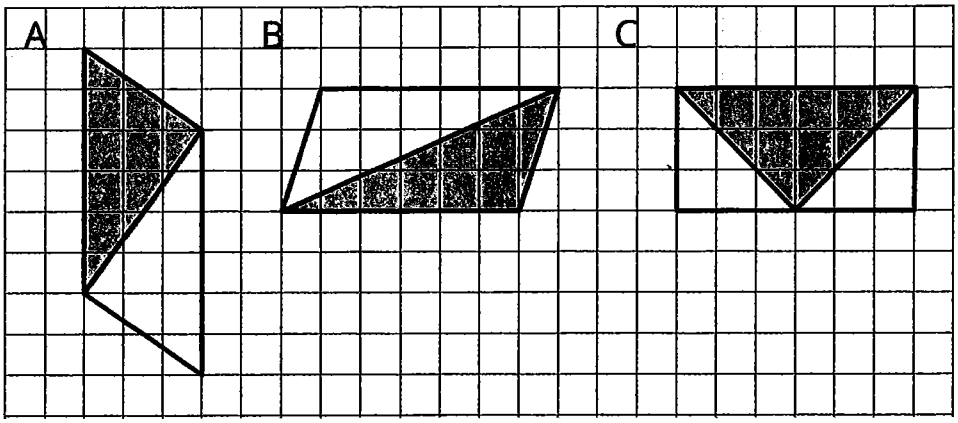
Explain why each of the following triangles has an area of 9 square units.



Possible Solutions

Answers vary. Sample explanation: Each triangle is half of a parallelogram with an area of 18 square units (i.e., with a base of 6 units and a height of 3 units), as shown in these diagrams.

Lesson 13 Practice Problems



Problem 5

From Grade 6, Unit 1, Lesson 9

a. A parallelogram has a base of 12 meters and a height of 1.5 meters. What is its area?

b. A triangle has a base of 16 inches and a height of $\frac{1}{8}$ inches. What is its area?

c. A parallelogram has an area of 28 square feet and a height of 4 feet. What is its base?

d. A triangle has an area of 32 square millimeters and a base of 8 millimeters. What is its height?

Possible Solutions

a. 18 square meters

b. 1 square inch

c. 7 feet

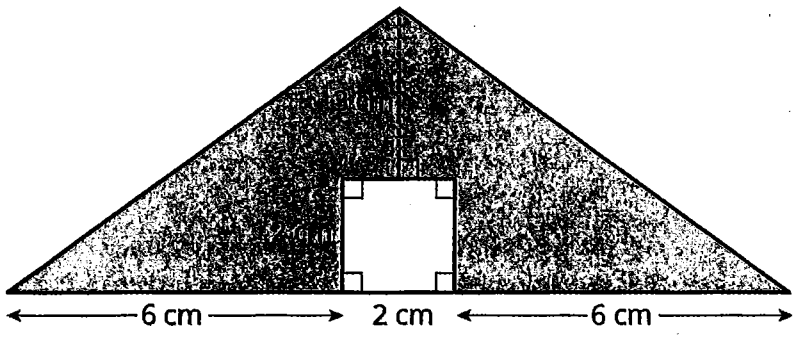
d. 8 millimeters

Problem 6

From Grade 6, Unit 1, Lesson 3

Find the area of the shaded region. Show or explain your reasoning.

E



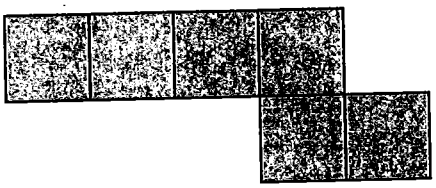
Possible Solutions

31 sq cm. Sample reasoning: The two right triangles can be put together to make a 7 cm-by-5 cm rectangle whose area is 35 sq cm. However, a 2 cm-by-2 cm square is removed. The shaded area is 31 sq cm.

Lesson 14 Practice Problems

Problem 1

Can the following net be assembled into a cube? Explain how you know. Label parts of the net with letters or numbers if it helps your explanation.

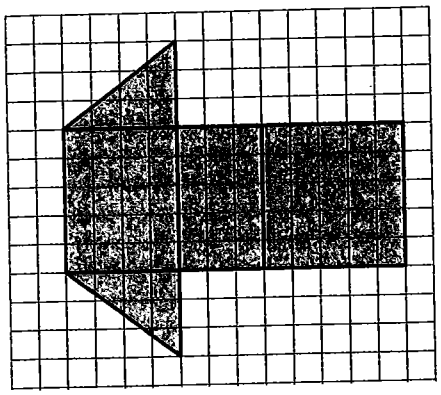


Possible Solutions

No. Sample explanation: The four squares placed side by side can only be folded in one way to meet up with one another, making a cube without a top and bottom. One of the remaining two squares can be folded to make the top or bottom, but the other one cannot be used.

Problem 2

a. What polyhedron can be assembled from this net? Explain how you know.



b. Find the surface area of this polyhedron. Show your reasoning.

Possible Solutions

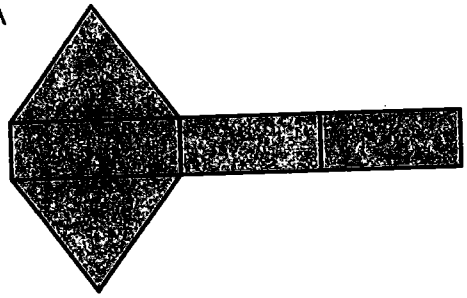
a. A triangular prism. Sample explanation: There are two identical triangles that are the bases. The rest of the faces are rectangles.

b. 72 square units. Sample reasoning: The areas of the three rectangles are 20, 15, and 25 square units. The areas of the two triangles are $2(\frac{1}{2} \cdot 4 \cdot 3)$ or 12 square units.
$20 + 15 + 25 + 2(6) = 72$.

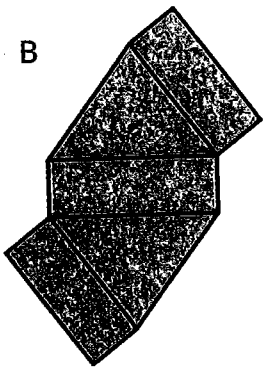
Problem 3

Here are two nets. Mai said that both nets can be assembled into the same triangular prism. Do you agree? Explain or show your reasoning.

A



B



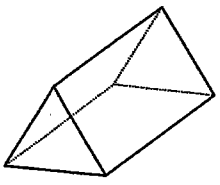
Possible Solutions

Agree. Sample reasoning: Both nets are composed of the same set of polygons. The positions of the one rectangular face are different, but when assembled, that face will meet the same edge of three other polygons.

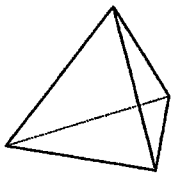
Problem 4

From Grade 6, Unit 1, Lesson 13

Here are two three-dimensional figures.



A



B

Tell whether each of the following statements describes Figure A, Figure B, both, or neither.

Lesson 14 Practice Problems

a. This figure is a polyhedron.
b. This figure has triangular faces.
c. There are more vertices than edges in this figure.
d. This figure has rectangular faces.
e. This figure is a pyramid.
f. There is exactly one face that can be the base for this figure.
g. The base of this figure is a triangle.
h. This figure has two identical and parallel faces that can be the base.

Possible Solutions

a. Both
b. Both
c. Neither
d. Figure A
e. Figure B
f. Neither
g. Both
h. Figure A

Problem 5

From Grade 6, Unit 1, Lesson 12

Select **all** units that can be used for surface area. Explain why the others cannot be used for surface area.

A. square meters
B. feet
C. centimeters
D. cubic inches
E. square inches
F. square feet

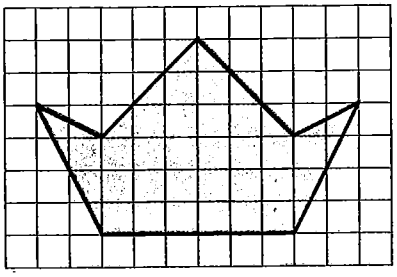
Possible Solutions

A, E, F. Options B (feet) and C (centimeters) are units of length. Option D (cubic inches) is a unit for volume.

Problem 6

From Grade 6, Unit 1, Lesson 11

Find the area of this polygon. Show your reasoning.



Possible Solutions

33 square units. Reasoning varies.

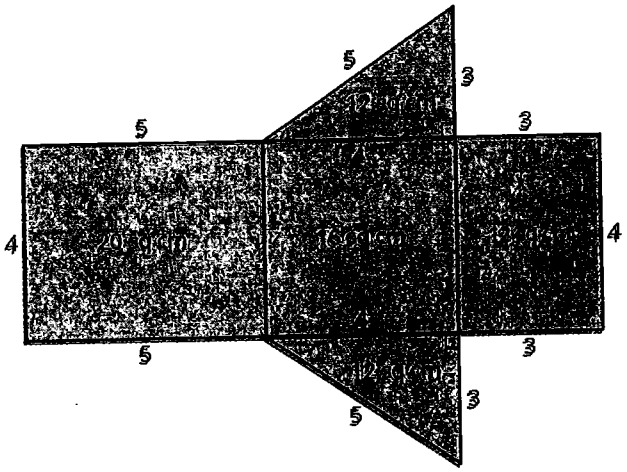
Lesson 15 Practice Problems

Problem 1

Jada drew a net for a polyhedron and calculated its surface area.

a. What polyhedron can be assembled from this net?

b. Jada made some mistakes in her area calculation. What were the mistakes?



c. Find the surface area of the polyhedron. Show your reasoning.

Possible Solutions

a. Triangular prism

b. She calculated the areas of the two triangular faces incorrectly. The right triangles have a base of 4 cm and a height of 3 cm, so the area of each should be $\frac{1}{2} \cdot 4 \cdot 3$ or 6 sq cm. Jada wrote "12 sq cm" for the area of each triangle.

c. 60 sq cm. The triangular faces should be 6 sq cm each, so the surface area is $20 + 16 + 12 + 6 + 6$, or 60.

Problem 2

A cereal box is 8 inches by 2 inches by 12 inches. What is its surface area? Show your reasoning. If you get stuck, consider drawing a sketch of the box or its net and labeling the edges with their measurements.

Possible Solutions

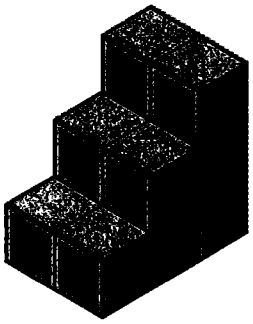
272 square inches. Sample reasoning:

- The top and bottom faces are 2 inches by 8 inches each, so their combined area is $2(2 \cdot 8)$ or 32 square inches.
- The front and back faces are 8 inches by 12 inches each, so their combined area is $2(8 \cdot 12)$ or 192 square inches.
- The side faces are 2 inches by 12 inches each, so their combined area is $2(2 \cdot 12)$ or 48 square inches.
- The surface area is $32 + 192 + 48$ or 272 square inches.

Problem 3

From Grade 6, Unit 1, Lesson 12

Twelve cubes are stacked to make this figure.



a. What is its surface area?

b. How would the surface area change if the top two cubes are removed?

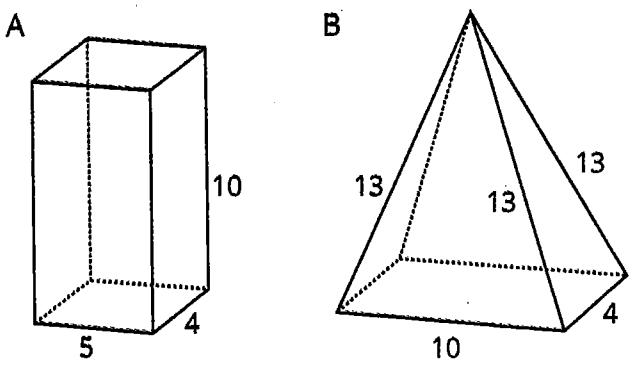
Possible Solutions

a. 36 square units

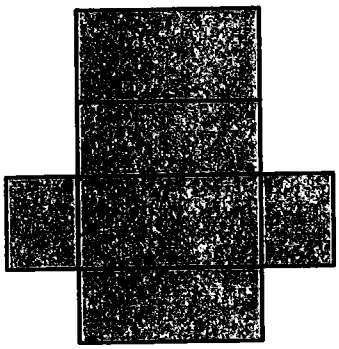
b. The surface area would decrease by 6 square units.

Problem 4

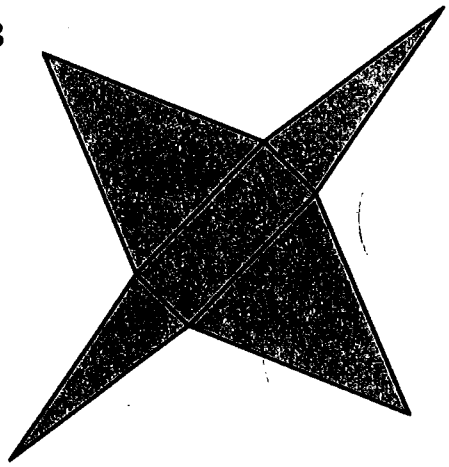
Here are two polyhedra and their nets. Label all edges in the net with the correct lengths.



A

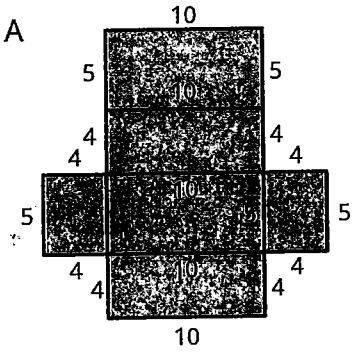


B

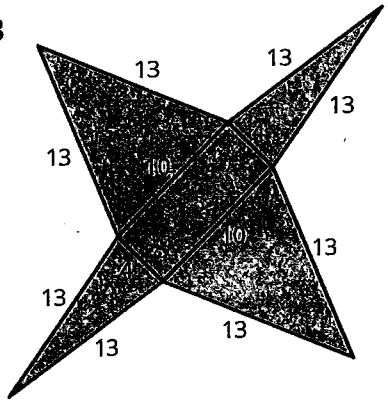


Possible Solutions

A



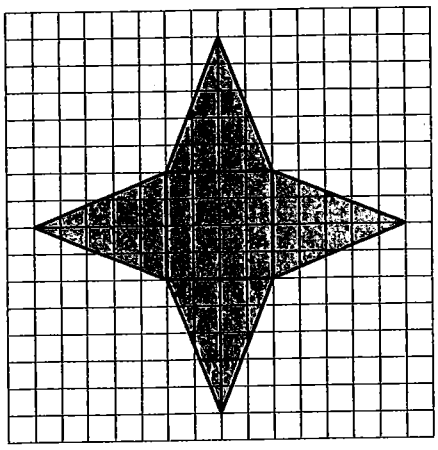
B



Problem 5

From Grade 6, Unit 1, Lesson 14

a. What three-dimensional figure can be assembled from the net?



b. What is the surface area of the figure? (One grid square is 1 square unit.)

Possible Solutions

a. Square pyramid

b. 56 square units. The area of the base is 16 square units. Each triangular face has a base of 4 units and a height of 5 units. This means each triangular face has an area of 10 square units. The total surface area is 56 square units, because $16 + 10 + 10 + 10 + 10 = 56$.

Lesson 16 Practice Problems

Problem 1

Match each quantity with an appropriate unit of measurement.

A. The surface area of a tissue box	1. Square meters
B. The amount of soil in a planter box	2. Yards
C. The area of a parking lot	3. Cubic inches
D. The length of a soccer field	4. Cubic feet
E. The volume of a fish tank	5. Square centimeters

Possible Solutions

A. 5

B. 3, 4

C. 1

D. 2

E. 3, 4

Problem 2

Here is a figure built from snap cubes.

a. Find the volume of the figure in cubic units.

b. Find the surface area of the figure in square units.

c. True or false: If we double the number of cubes being stacked, both the volume and surface area will double. Explain or show how you know.

Possible Solutions

a. 4 cubic units. $(1 \cdot 1 \cdot 4) = 4$.

b. 18 square units. $(4 \cdot 4) + (2 \cdot 1) = 18$.

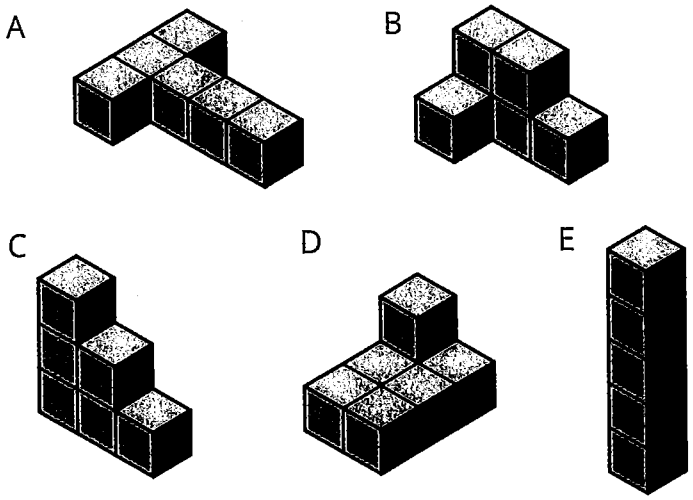
c. False. Sample reasoning: The volume will double to 8 cubic units, but the surface area will not. Only the side faces will double in area, to $(4 \cdot 8)$ or 32 square units, but the top and bottom faces will not double, so the surface area will be 34, not 36, square units.

Problem 3

Lin said, "Two figures with the same volume also have the same surface area."

a. Which two figures suggest that her statement is true?

b. Which two figures could show that her statement is *not* true?



Possible Solutions

a. B and C

b. A and B, or A and C

Problem 4

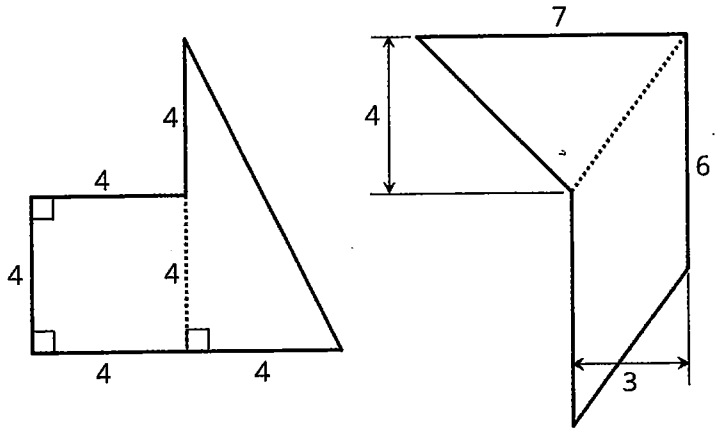
From Grade 6, Unit 1, Lesson 11

Draw a pentagon (five-sided polygon) that has an area of 32 square units. Label all relevant sides or segments with their measurements, and show that the area is 32 square units.

Possible Solutions

Answers vary. Sample responses:

Lesson 16 Practice Problems



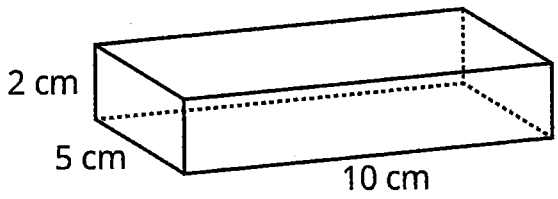
- The first pentagon is composed of a square and a right triangle. The square has an area of 16 square units. The triangle has a base of 4 and a height of 8, so its area is 16 square units. The combined area is $16 + 16$ or 32 square units.
- The second pentagon is composed of a parallelogram with a base of 6 and a height of 3, and a triangle with a base of 7 and a height of 4. The area of the parallelogram is $6 \cdot 3$ or 18 square units. The area of the triangle is $\frac{1}{2} \cdot 7 \cdot 4$ or 14 square units. The combined area is $18 + 14$ or 32 square units.

Problem 5

From Grade 6, Unit 1, Lesson 15

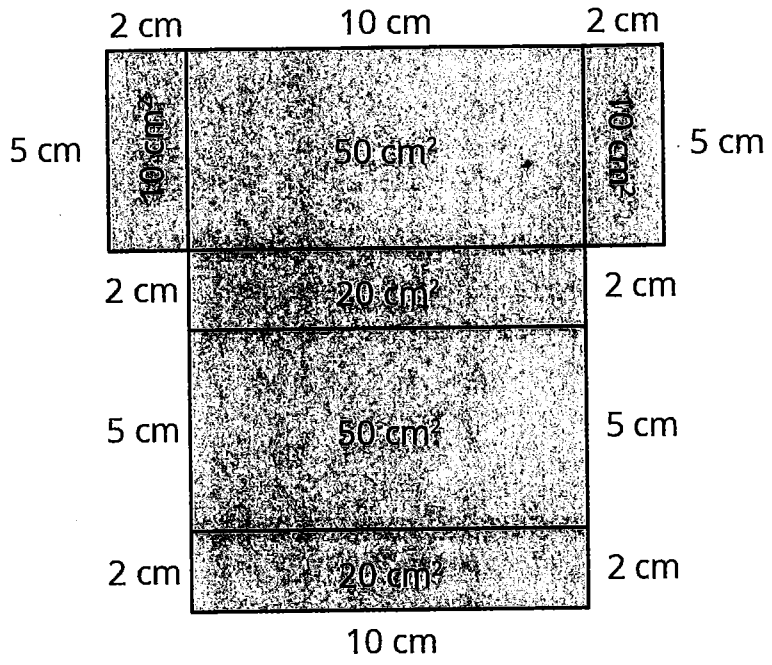
a. Draw a net for this rectangular prism.

b. Find the surface area of the rectangular prism.



Possible Solutions

a. Diagrams vary. Here is a sample net.

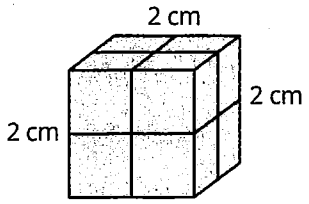


b. 160 square units. (There are two faces with an area of 50 square cm, two faces with an area of 20 square cm, and two faces with an area of 10 square cm.)

Lesson 17 Practice Problems

Problem 1

What is the volume of this cube?



Possible Solutions

8 cu cm ($2 \cdot 2 \cdot 2 = 8$)

Problem 2

a. Decide if each number on the list is a perfect square.

A. 16	E. 125
B. 20	F. 144
C. 25	G. 225
D. 100	H. 10,000

b. Write a sentence that explains your reasoning.

Possible Solutions

a. All of these numbers, except B and E, are perfect squares.

b. Answers vary. Sample response: Perfect squares can be found by multiplying a whole number by itself.

Problem 3

a. Decide if each number on the list is a perfect cube.

A. 1
B. 3
C. 8
D. 9
E. 27
F. 64
G. 100
H. 125

b. Explain what a perfect cube is.

Possible Solutions

a. All of the numbers except B, D, and G are perfect cubes.

b. Answers vary. Sample response: Perfect cubes can be found by multiplying whole numbers by themselves three times.

Problem 4

a. A square has side length 4 cm. What is its area?

b. The area of a square is 49 m^2. What is its side length?

c. A cube has edge length 3 in. What is its volume?

Possible Solutions

a. 16 cm^2

b. 7 m

c. 27 in^3

Problem 5

From Grade 6, Unit 1, Lesson 16

Prism A and Prism B are rectangular prisms. Prism A is 3 inches by 2 inches by 1 inch. Prism B is 1 inch by 1 inch by 6 inches.

Select **all** statements that are true about the two prisms.

A. They have the same volume.

B. They have the same number of faces.

C. More inch cubes can be packed into Prism A than into Prism B.

D. The two prisms have the same surface area.

E. The surface area of Prism B is greater than that of Prism A.

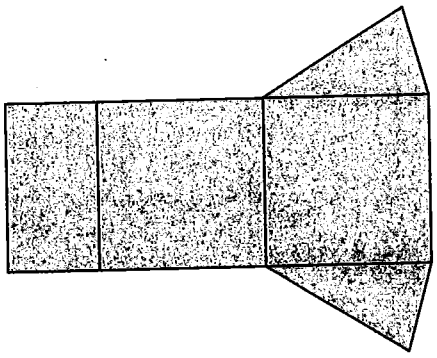
Possible Solutions

A, B, E

Problem 6

From Grade 6, Unit 1, Lesson 14

a. What polyhedron can be assembled from this net?

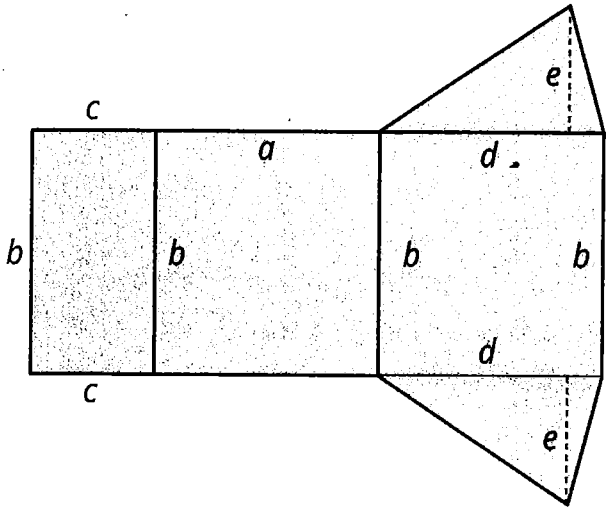


b. What information would you need to find its surface area? Be specific, and label the diagram as needed.

Possible Solutions

a. Triangular prism

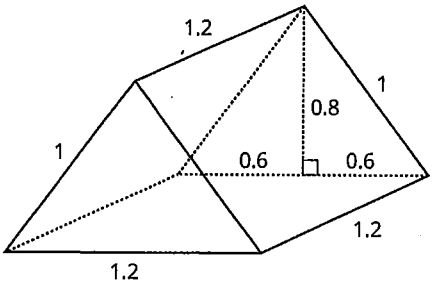
b. Length and width of each rectangular face (as shown in the diagram), as well as the height of the triangular faces



Problem 7

From Grade 6, Unit 1, Lesson 15

Find the surface area of this triangular prism. All measurements are in meters.



Possible Solutions

4.8 square meters. Sample reasoning:

- There are two triangular faces with an area of 0.48 square meters each. $\frac{1}{2} \cdot (1.2) \cdot (0.8) = 0.48$.
- There are two rectangular faces with area of 1.2 square meters each. $1 \cdot (1.2) = 1.2$.
- There is one rectangular face with an area of $(1.2) \cdot (1.2) = 1.44$ square meters.
- $2 \cdot (0.48) + 2 \cdot (1.2) + (1.44) = 4.8$, or 4.8 square meters.

Lesson 18 Practice Problems

Problem 1

a. What is the volume of a cube with edge length 8 in?

b. What is the volume of a cube with edge length $\frac{1}{3}$ cm?

c. A cube has a volume of 8 ft^3. What is its edge length?

Possible Solutions

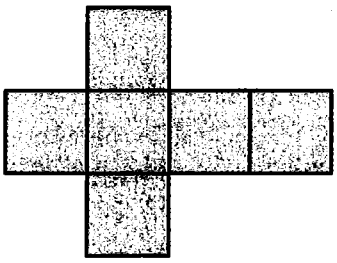
a. 512 cu in ($8 \cdot 8 \cdot 8 = 512$)

b. $\frac{1}{27}$ cu cm ($\frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3} = \frac{1}{27}$)

c. 2 ft ($2 \cdot 2 \cdot 2 = 8$)

Problem 2

a. What three-dimensional figure can be assembled from this net?



b. If each square has a side length of 61 cm, write an expression for the surface area and another for the volume of the figure.

Possible Solutions

a. Cube

b. The surface area is $6 \cdot 61^2$ sq cm, and the volume is 61^3 cu cm.

Problem 3

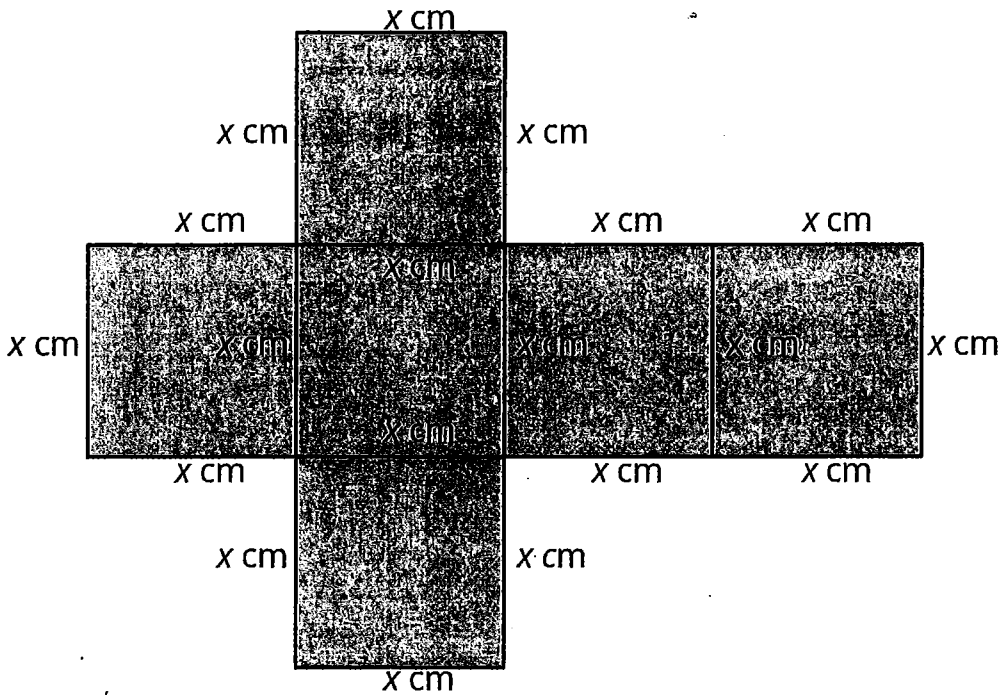
a. Draw a net for a cube with edge length x cm.

b. What is the surface area of this cube?

c. What is the volume of this cube?

Possible Solutions

a.



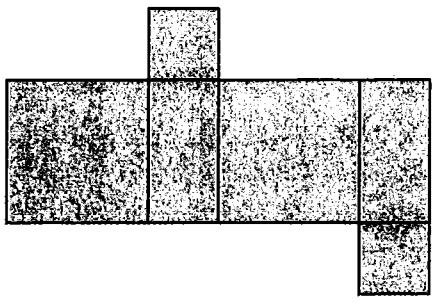
b. $6x^2$ sq cm (or equivalent)

c. $x \cdot x \cdot x$ cu cm (or equivalent)

Problem 4

From Grade 6, Unit 1, Lesson 14

Here is a net for a rectangular prism that was not drawn accurately.



a. Explain what is wrong with the net.

b. Draw a net that can be assembled into a rectangular prism.

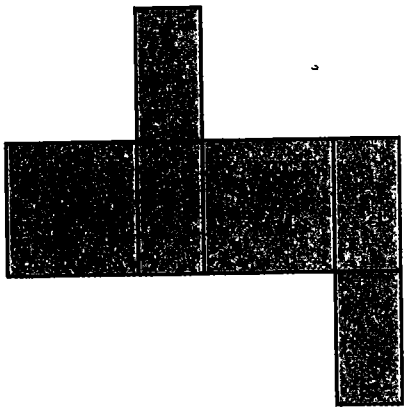
c. Create another net for the same prism.

Possible Solutions

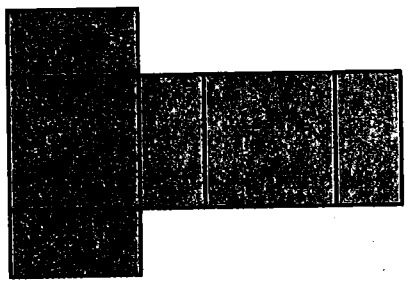
a. When the shape is folded, the two small squares are not the right size to close the three-dimensional figure. The small squares can be replaced with rectangles as in the picture,

or the large squares can be the same size and shape as the two (non-square) rectangles in the net.

b.



c.

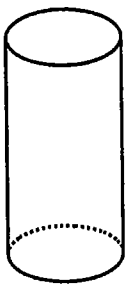


Problem 5

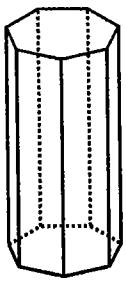
From Grade 6, Unit 1, Lesson 13

State whether each figure is a polyhedron. Explain how you know.

A



B



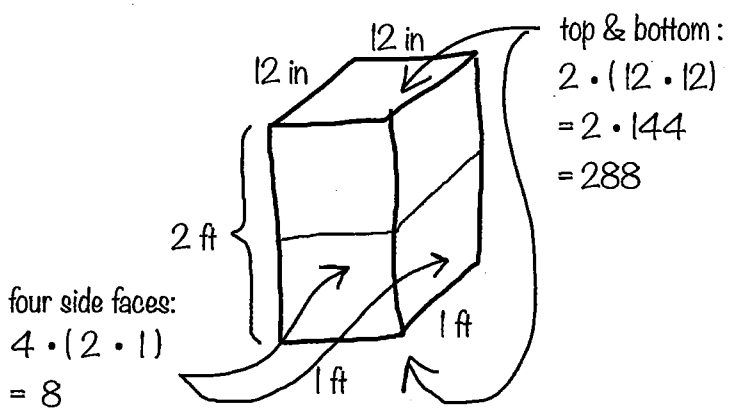
Possible Solutions

Figure A is not a polyhedron. It has a curved surface and there are faces that are not polygons.
Figure B is a polyhedron. It is composed of polygons and each side of every polygon joins a side of another polygon.

Problem 6

From Grade 6, Unit 1, Lesson 12

Here is Elena's work for finding the surface area of a rectangular prism that is 1 foot by 1 foot by 2 feet.



She concluded that the surface area of the prism is 296 square feet. Do you agree with her conclusion? Explain your reasoning.

Possible Solutions

Disagree. Sample reasoning: Elena calculated the area of the top and bottom faces in square inches but the area of the side faces in square feet. The combined area of the top and bottom faces is 2 square feet, so the correct surface area is 10 square feet.