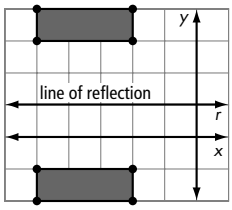
Answers

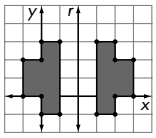
Get Ready, pages 2–3

1. a) 4, vertically up **b)** 3 units horizontally left, 4 units vertically down

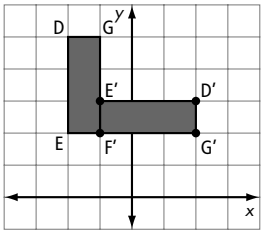
2. a)



b)



3. a)



b) D′ = (2, 3) E′ = (–1, 3) F′ = (–1, 2) G′ = (2, 2)

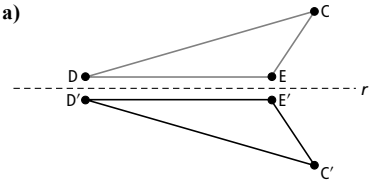
4. 286 cm^2

Math Link

1. a) YES **b)** 3

2. a) YES **b)** NO

3. a)



b) C

c) C′

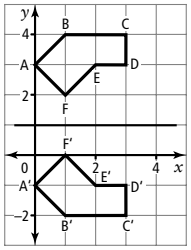
d) vertically

4. a) A to A′: 5, 3; B to B′: 5 spaces right and 3 spaces up; C to C′: 5 spaces right and 3 spaces up

b) Answers will vary. Example: 4 spaces left and 4 spaces down would put the translation in quadrant III.

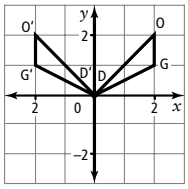
1.1 Warm Up, page 5

1. a)



A′ (0, –1); B′ (1, –2); C′ (3, –2); D′ (3, –1); E′ (2, –1); F′ (1, 0)

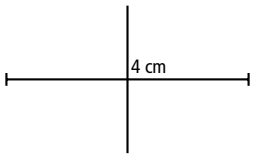
b)



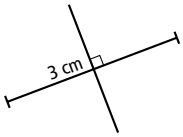
D′ (0, 0); O′ (–2, 2); G′ (–2, 1)

2. a, b, d

3. a)



b)



4. Answers will vary.

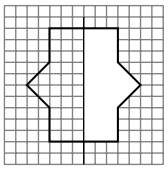
1.1 Line Symmetry, pages 6–14

Working Example 1: Show You Know

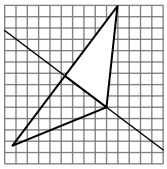
a) 1; horizontal **b)** 1; vertical **c)** 4; 1 horizontal, 1 vertical, 2 oblique **d)** 1; vertical

Working Example 2: Show You Know

a)



b)



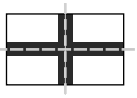
Communicate the Ideas

1. NO. A rectangle that is a square has 4 lines of symmetry.

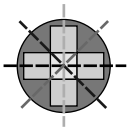
2. KENDRA. It does not overlap itself if it's cut out and folded.

Practise

3. a)

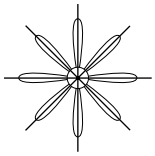


b)

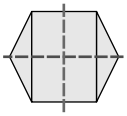


c)

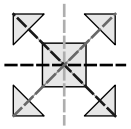
d)



4. a)

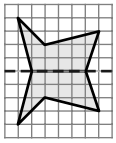


b)

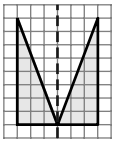


5.

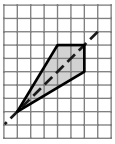
6. a)



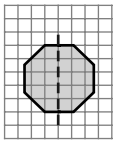
b)



c)

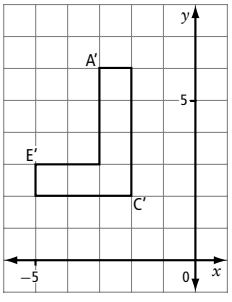


d)



Apply

7. a)



b) A′ (–3, 6); C′ (–2, 2); E′ (–5, 3)

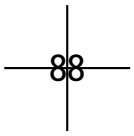
c) YES; The line of reflection divides the original image and the reflection image into 2 identical parts.

8. a) 1 **b)** 1 **c)** 2 **d)** 4

9. a) B, C, D, E, H, I, K, O, X **b)** A, H, I, M, O, T, U, V, W, X, Y
c) H, I, O, X

10. Answers will vary: Examples: WOW WOW WHO WHO HAH HAH HI HI

11. Answers will vary. Example:

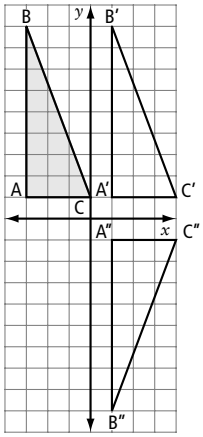


Math Link

Answers will vary.

1.2 Warm Up, page 15

1. a) and **c)**



b) A′ (1, 1); B′ (1, 9); C′ (4, 1)

2. a)

Figure	Lines of Symmetry	Number of Lines of Symmetry
Equilateral triangle		3
Square		4
Regular pentagon		5
Regular hexagon		6

b) The number of sides is equal to the number of lines of symmetry.

3. a) 5 **b)** 0

1.2 Rotation Symmetry and Transformations, pages 16–24

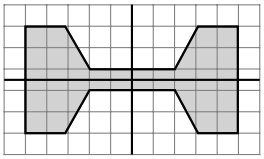
Working Example 1: Show You Know

	Order of Rotation	Angle of Rotation (Degrees)	Angle of Rotation (Fraction of a Turn)
a)	*2*	$\frac{360°}{2} = 180°$	$\frac{1 \text{ turn}}{\text{order of rotation}} = \frac{1}{2}$ turn
b)	*1*	*360°*	*1 turn*
c)	*3*	*120°*	$\frac{1 \text{ turn}}{\text{order of rotation}} = \frac{1}{3}$ turn

Working Example 2: Show You Know

a) Figure A: BOTH; Figure B: ROTATION SYMMETRY

b)



c) Figure A: 2; Figure B: 4 **d)** Figure A: reflection along a horizontal or vertical line; Figure B: rotation about the centre

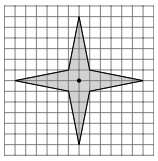
Communicate the Ideas

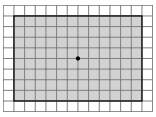
1. Answers will vary. Example: Rotation symmetry is when a section of a design can be rotated around the centre and shows symmetry with other parts.

2. BOTH; The design can be folded over a horizontal or vertical line of symmetry to overlap itself, or a corner piece can be rotated 4 times to create the design.

Practise

3. a)

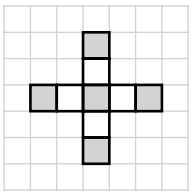
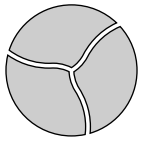




b)

	Order of Rotation	Angle of Rotation (Degrees)	Angle of Rotation (Fraction of a Turn)
Figure 1	*4*	$\frac{360°}{4} = 90°$	$\frac{1 \text{ turn}}{\text{order of rotation}} = \frac{1}{4}$ turn
Figure 2	*2*	*180°*	$\frac{1}{2}$ *turn*

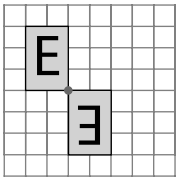
4.

Figure	Rotation Symmetry (Yes or No)	Order of Rotation	Angle of Rotation (Degrees)
a) 	Yes	4	90°
b) 	Yes	3	120°
c) XOX	Yes	2	180°

5. a) Number of lines of symmetry = 6, Order of rotation = 6 **b)** Number of lines of symmetry = 2, Order of rotation = 2

Apply

6.

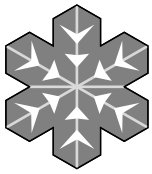


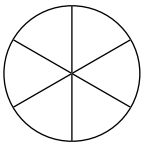
7. a) ; square

b) Rotate the figure 180° and join the 2 figures. Translate the new figure to the right so it does not overlap. Join the two figures. Now, join the new figure with the original one on the right.

8. a) The top half is rotated 180°. **b)** Cards are designed so they can be read while being held from either end. **c)** NO; If you fold it in half, the design does not overlap.

9.





Math Link

Answers will vary.

1.3 Warm Up, page 25

1. a) 248 m^2 **b)** 471 cm^2

2. 470 cm^2

1.3 Surface Area, pages 26–35

Working Example 1: Show You Know

a) The total area of the faces that are not against the ground is 19 600 cm^2.

b) The area of the step that is against the ground is 7 200 cm^2.

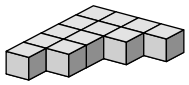
Working Example 2: Show You Know

The surface area is 284 m^2.

Communicate the Ideas

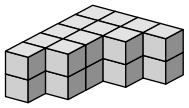
1. Answers will vary. Example:

a)



You can use symmetry to find the surface area of 1 side, and then you can multiply it by 2 to get the surface area of the opposite side.

b)



The area of overlap is 12 cm^2.

c) The overlap reduces the total surface area by twice the amount of the surface area that is touching the other shape.

2. Nick should find the area of each shape and add them together. Then he should subtract 2 times the area of the overlap (the bottom of the cylinder). He should also subtract the area of the bottom.

Practise

3. a) 72 cm^2 **b)** 112 cm^2

4. a) The area of overlap is 4 cm^2. **b)** The surface area is 70 cm^2.

5. length = 17 cm; width = 9 cm; height = 11 cm

Apply

6. a) The surface area is 36 cm^2. **b)** The surface area of a 1 × 2 × 5 rectangular prism is 34 cm^2. **c)** NO. There are more surfaces that overlap in the 1 × 2 × 5 rectangular prism.

7. Answers will vary. Examples: when icing a cake, painting a building, or wrapping a present.

8. a) The top and bottom, left and right, and front and back are symmetrical so they have the same surface area.

b) The surface area is 324.6 cm^2.

Math Link

Answers will vary. Examples: **a)** 52 **b)** length: 10 cm; width: 7 cm; height: 2 cm **c)** The surface area is 208 cm^2.

Graphic Organizer, page 36

Rotation Symmetry

Definition: when a shape or design can be turned about its centre of rotation so it fits onto itself more than once in 1 complete turn
Define order of rotation: the number of times a shape fits onto itself in 1 complete turn
Example: 8
Define angle of rotation: the minimum measure of the angle needed to turn a shape or design onto itself
Example: 45°
Example: $\frac{1}{8}$ turn

Surface Area

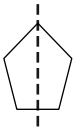
Definition: the number of square units needed to cover an object

Ways to find the surface area of an object: find the surface area of each face and add them together; use symmetry; for a composite shape, find the surface area of each part and subtract the area of the overlapping parts

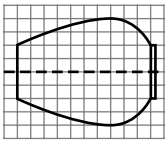
Line Symmetry

Definition: a type of symmetry where a line of symmetry divides an image or object into 2 identical, reflected halves
Example: the Canadian flag has line symmetry
Examples:

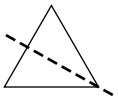
• vertical line of symmetry:



• horizontal line of symmetry:



• oblique line of symmetry:



You can complete a symmetrical drawing by: paper folding; measuring; counting

Chapter 1 Review, pages 37–39

1. type of symmetry in which the shape can be divided into reflected halves

2. type of symmetry in which a shape is turned onto itself

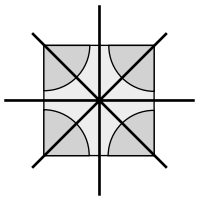
3. the size of turn for a shape to rotate onto itself

4. the total area of all the faces of an object

5. another name for a reflection line

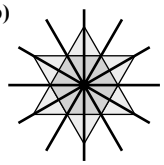
6. number of times a shape fits onto itself in 1 complete turn

7. a)



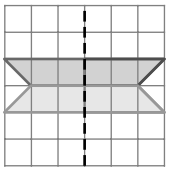
Number of lines of symmetry: 4
Description: 1 horizontal, 1 vertical, 2 oblique

b)

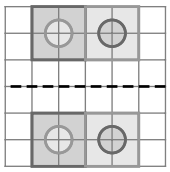


Number of lines of symmetry: 6
Description:1 horizontal, 1 vertical, 4 oblique

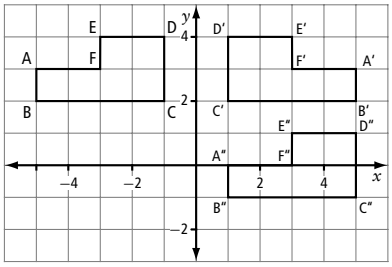
8. a)



b)



9. a) and **c)**



b) A′ (5, 3) B′ (5, 2) C′ (1, 2) D′ (1, 4) E′ (3, 4) F′ (3, 3)
d) REFLECTION; The reflection shows a vertical line of symmetry.

10.

Diagram	Order of Rotation	Angle of Rotation (Degrees)	Angle of Rotation (Fraction of a Turn)
a) 	*4*	$\frac{360°}{4} = 90°$	$\frac{1}{4}$
b) 	*8*	*45°*	$\frac{1}{8}$

11. ROTATION SYMMETRY; There is no line symmetry because of the shading and overlapping.

12. The total surface of the faces that are showing is 521.1 cm^2.

13. a) small block: 444 cm^2; large block: 1088 cm^2 **b)** The surface area of the 2 blocks when separated is 1532 cm^2. **c)** The surface area of the stacked blocks is 1244 cm^2.

Key Word Builder, page 40

Across:

6. surface area **8.** angle of rotation

Down:

1. line symmetry **2.** rotation symmetry **3.** line of symmetry
4. order of rotation **5.** centre of rotation **7.** symmetry

Chapter 1 Practice Test, pages 41–42

1. D **2.** D **3.** D

4. a) 8 **b)** 45°

5. Answers will vary. Examples: **a)** B, C, D, E, H, I, K, O, X
b) A, H, I, M, O, T, U, V, W, X, Y **c)** O **d)** H, I, N, O, S, X, Z

6. a) 358 cm^2 **b)** 3; 3; 358 cm^2

Math Link: Wrap It Up!, page 43

Answers will vary.

Challenge, page 44–45

Answers will vary.