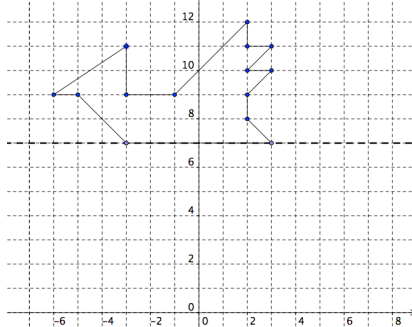


## Lines of Symmetry

Notes:

Complete each shape by reflecting it over the each dotted line.

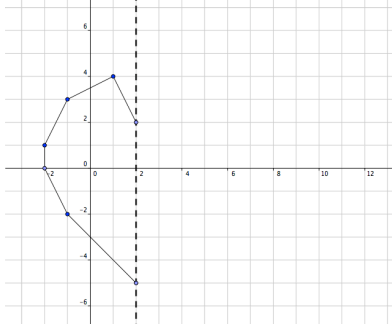
### 160. Vertical symmetry



The line that the points reflect over is called a **line of symmetry**.

161. Describe the position of the line.

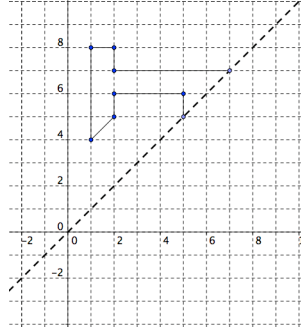
### 162. Horizontal symmetry



The line that the points reflect over is called a **line of symmetry**.

163. Describe the position of the line.

### 164. Line Symmetry



The line that the points reflect over is called a **line of symmetry**.

165. Describe the position of the line.

Determine the number of lines symmetry found in each picture from the natural world.

166. A. A butterfly.



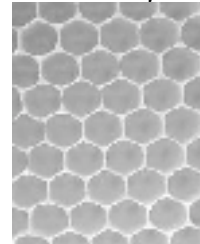
B. A turtle's shell.



C. Pineapple skin.



D. A honeycomb.




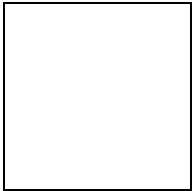










Challenge #9:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

167. Name as many words as you can that have symmetry. For example, MOM has horizontal symmetry and BEE has vertical symmetry.

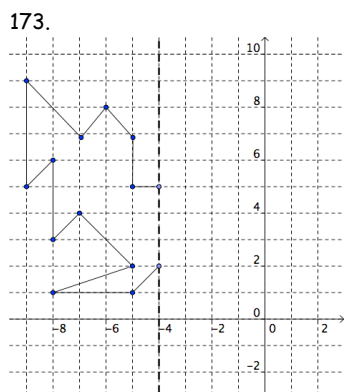
Determine the number of lines symmetry if any found in each picture. Draw the lines of symmetry.

168.	A. Medical symbol 	B. Woman 	C. Biohazard 	D. British 
169.	A. Medical services 	B. ATV symbol 	C. Peace 	D. Division 
170.	A. Snow flake 	B. Taj Mahal 	C. Star fish 	D. Mathbeacon Author 

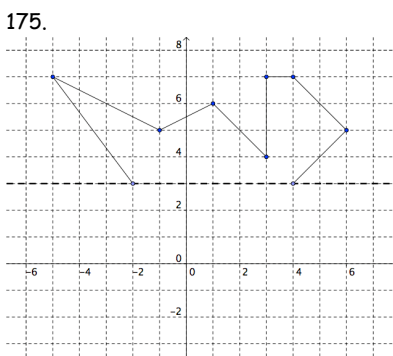
Name the type of symmetry that each word has if any.(Horizontal, Vertical or No Symmetry)

171.	A. WOW	B. DECIDED	C. HOME	D. BOOHOO
172.	A. ICEBOX	B. MATHBEACON	C. MAM	D. BOXES

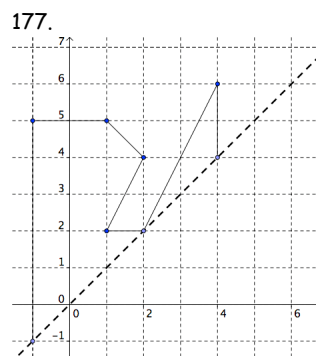
Complete each shape by reflecting it over the each dotted line.



174. Describe the position of the line of symmetry.



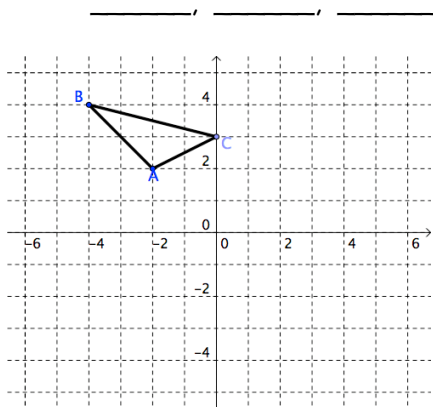
176. Describe the position of the line of symmetry.



178. Describe the position of the line of symmetry.

Draw each polygon after the following reflections.

179. Record the original coordinates:

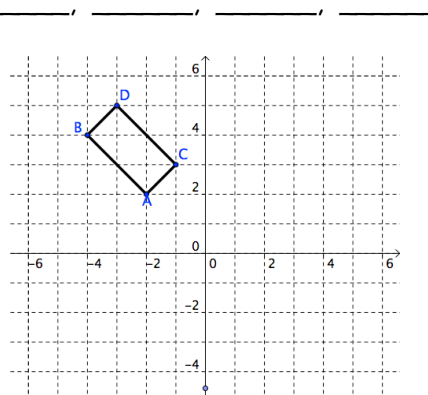


- Reflect object over the y-axis.
- Reflection the new object over the x-axis

180. Record the final coordinates after the 2 reflections:

\_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

181. Record the original coordinates:



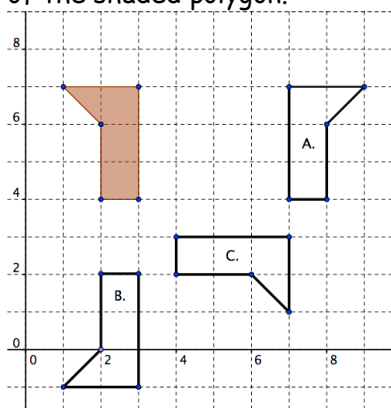
- Reflection in the line  $y=x$ .
- Reflection in the horizontal line through the y-axis as  $y=1$ .

182. Record the final coordinates after the 2 reflections:

\_\_\_\_\_ / \_\_\_\_\_ / \_\_\_\_\_

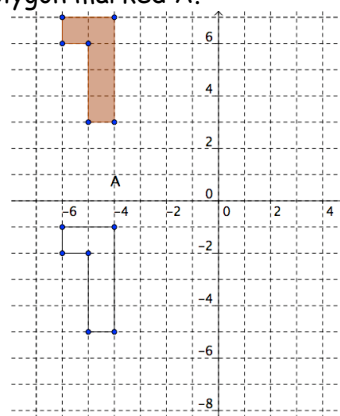
### Challenge #10:

183. Describe the location of each line of symmetry to make each polygon a reflection of the shaded polygon.



- A.
- B.
- C.

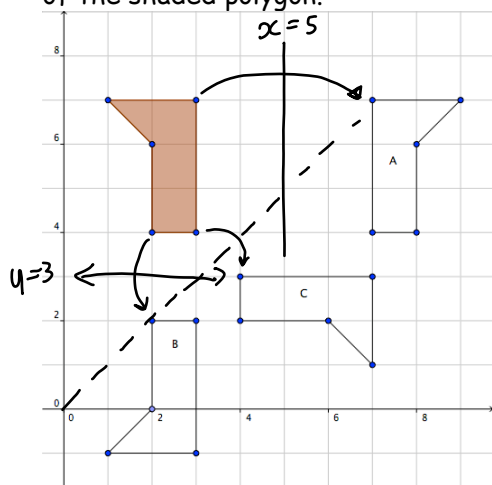
184. Describe the positions of two reflections that could transform the shaded polygon to the polygon marked A.



- A. Reflected over:
- B. Reflected over:
- C. Name a single transformation that could move the shaded polygon to position A.

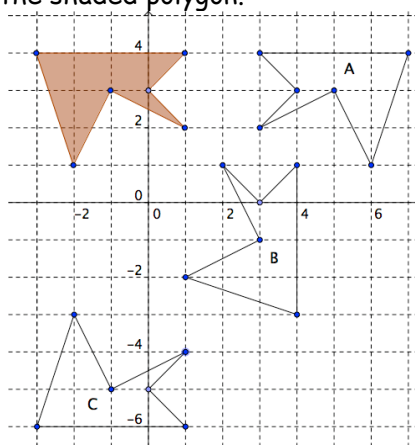
**Describe the line of symmetry.**

185. Describe the location of each line of symmetry to make each polygon a reflection of the shaded polygon.



- D. Reflects over the line  $x=5$ .
- E. Reflects over the line  $y=3$ .
- F. Reflects over the line  $y=x$ .

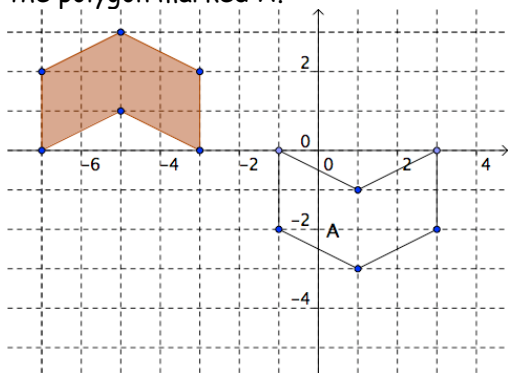
186. Describe the location of each line of symmetry to make each polygon a reflection of the shaded polygon.



- A.
- B.
- C.

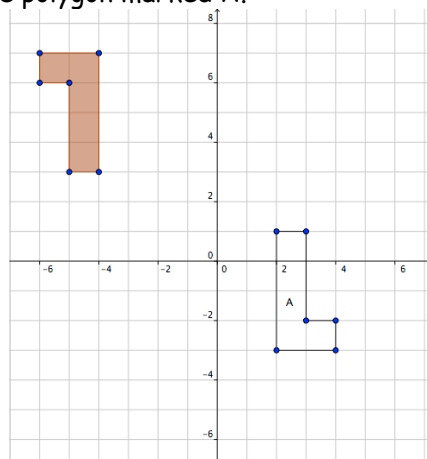
**Determine the two reflections that create the new position of a polygon.**

187. Describe the positions of two reflections that could transform the shaded polygon to the polygon marked A.



- A. Reflected over:
- B. Reflected over:
- C. Is this the only answer? Explain.

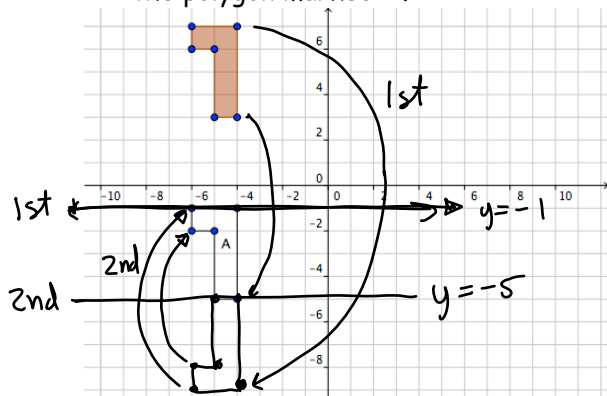
188. Describe the positions of two reflections that could transform the shaded polygon to the polygon marked A.



- A. Reflected over:
- B. Reflected over:

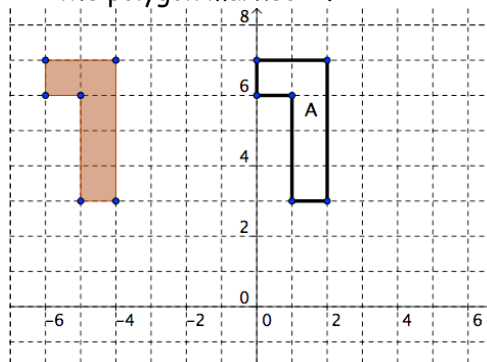
Determine the two reflections that create the new position of a polygon.

189. Describe the positions of two reflections that could transform the shaded polygon to the polygon marked A.



- A. Reflected over: *It could have reflected over the line  $y=-1$*
- B. Reflected over: *Followed by a reflection over the line  $y=-5$*
- C. Describe the above transformation in terms of a single transformation. *The object could be translated 8 units down and have the same effect.*

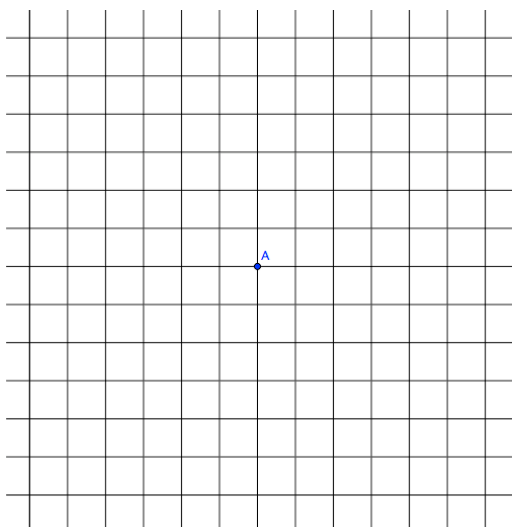
190. Describe the positions of two reflections that could transform the shaded polygon to the polygon marked A.



- A. Reflected over:
- B. Reflected over:
- C. Describe the above transformation in terms of a single transformation.

Get creative.


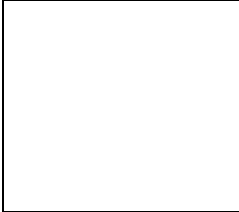

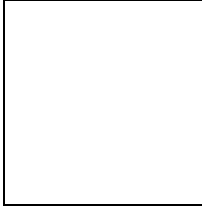



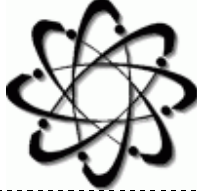




191. Create a symbol, or modify a symbol that has at least two lines of reflections. Let point A be the center the symbol.



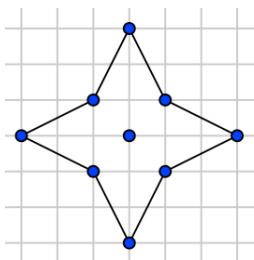
- A. Identify the line(s) of symmetry with dotted line(s).
- B. How many lines of symmetry are there:

## Rotational Symmetry

**Challenge #11:** Which of the following have rotational symmetry? (Symmetry by spinning)

192.	A. 	B. 	C. 	D. 
193.	A. 	B. 	C. 	D. 
194.	A. 	B. 	C. 	D. 

**Challenge #12:**



195. If the star is rotated clockwise to match itself, how big is the angle of rotation?

196. Before one revolution is completed, how many times can the star be rotated so that it matches itself?

**Challenge #13:**      A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

197. Name as many words as you can that have rotation symmetry. For example, "pod" has rotational symmetry because when it is spun 180° it still says pod.

Definition.

**Rotational Symmetry:**

The property of a shape where it can rotate less than  $360^\circ$  and match itself.

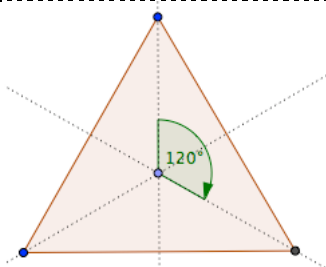
**Angle of rotation symmetry:**

The smallest angle needed for a shape to rotate to match itself.

- 

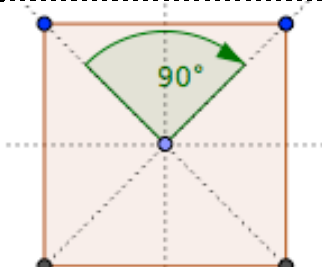
**Order of rotation symmetry:** The number of times a shape matches itself during a rotation of  $360^\circ$ .

- 



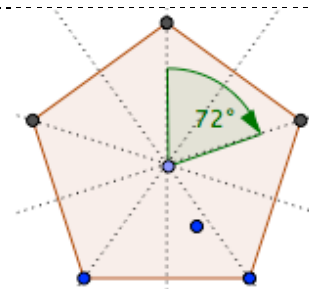
Angle of rotation:  $120^\circ$

Order of rotation: 3



Angle of rotation:  $90^\circ$

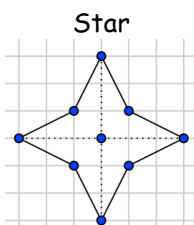
Order of rotation: 4



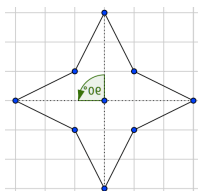
Angle of rotation:  $72^\circ$

Order of rotation: 5

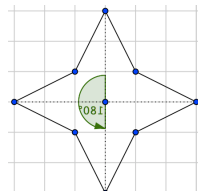
The star has an angle of rotation of  $90^\circ$  and an order of rotation of 4.



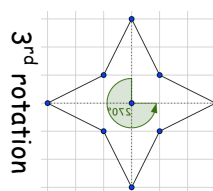
Star



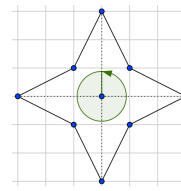
1<sup>st</sup> rotation



2<sup>nd</sup> rotation



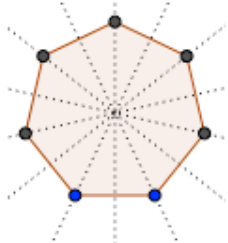
3<sup>rd</sup> rotation



4<sup>th</sup> rotation

Determine the order of rotation symmetry and the angle of rotation symmetry for each shape.

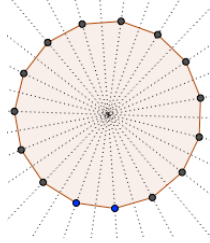
198. A seven-sided polygon.



A. Order:

B. Angle:

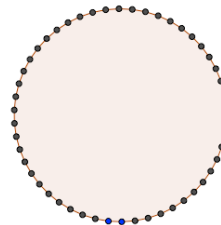
199. A fifteen-sided polygon.



A. Order:

B. Angle:

200. A fifty-sided polygon



A. Order:

B. Angle:

Determine the order of rotation symmetry found in natural world.

201.



202.



203.



Determine the angle of rotation symmetry found in each picture from the sign world.

204.



205.



206.



Rotation symmetry.

207. Determine the order of rotation symmetry for the saw blade (ignore shading and the center hexagon).



A. Determine the angle of rotation symmetry for the circular hubcap.



B. Determine the order of rotation symmetry for the saw blade.



Name the type of symmetry that each word has if any. (Horizontal, Vertical, Rotational or No Symmetry)

208.

A. BOOK

B. WIM

C. MOM

D. TUT

209.

A. SWIMS

B. OBOE

C. HOME

D. NON

210.

A. OXO

B. VEX

C. DIOXIDE

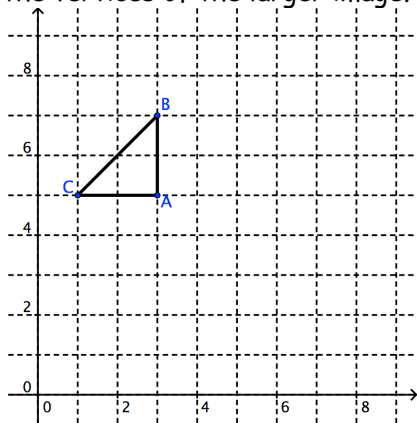
D. DAD



**Challenge #14:**

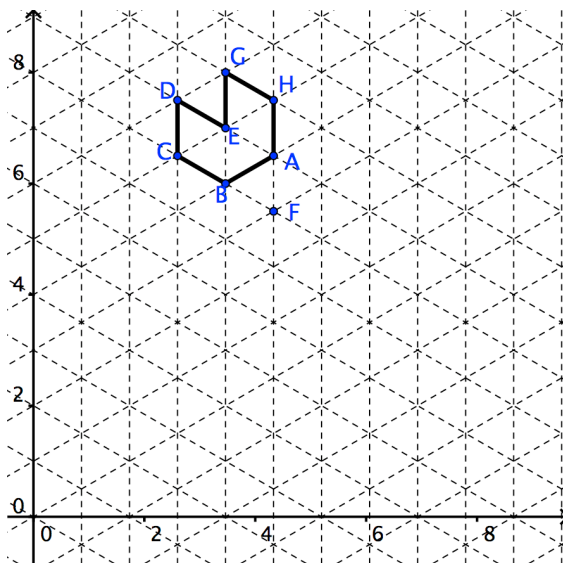
211. Triangle ABC is part of a larger shape to be created by the sum of three rotations.  
 Rotate ABC 90° about point A  
 Rotate ABC 180° about point A  
 Rotate ABC 270° about point A

Record the vertices of the larger image.



212. Describe any line or rotational symmetry in the larger image.

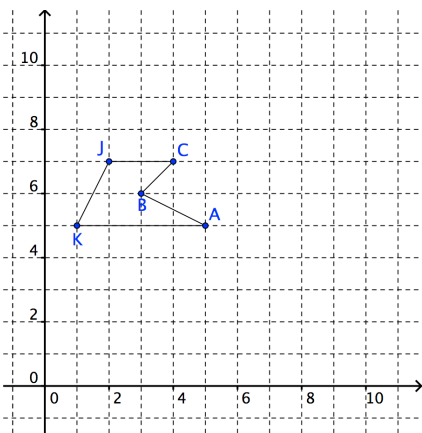
213. Complete the rotations.  
 Rotate the polygon 120° about vertex F.  
 Rotate the polygon 240° about vertex F.



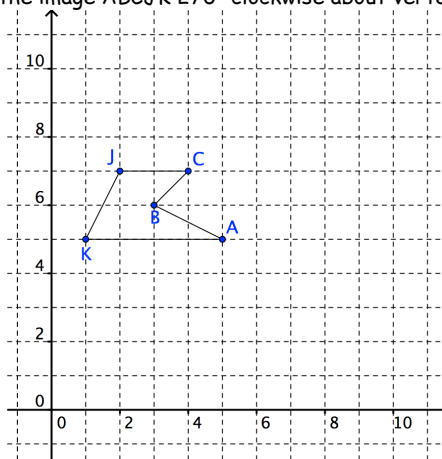
214. Describe any line symmetry or rotational symmetry that exists in the new image.

**Complete the rotations and label the new coordinates.**

215. Complete the rotations.  
 Rotate the image ABCJK 180° clockwise about vertex C.  
 Rotate the image ABCJK 90° clockwise about vertex K.



216. Complete the rotations.  
 Rotate the image ABCJK 270° clockwise about vertex A.

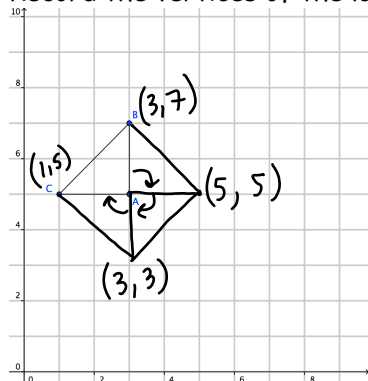


Rotate the points and record the image.


217. Triangle ABC is part of a larger shape to be created by the sum of three clockwise rotations.

- Rotate ABC 90° about point A.
- Rotate ABC 180° about point A.
- Rotate ABC 270° about point A.

Record the vertices of the larger image.

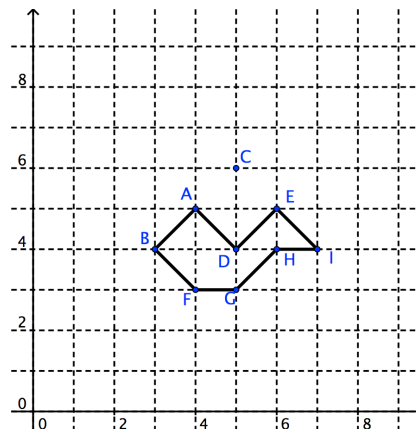


218. Describe any line or rotational symmetry in the larger image.

- Line symmetry  4 lines of symmetry
- Rotational Symmetry → order 4 with 90° Angle of rotation.

219. Polygon ABDEFGHI is part of a larger shape to be created by the sum of three clockwise rotations.

- Rotate the polygon 90° about point C.
- Rotate the polygon 180° about point C.
- Rotate the polygon 270° about point C.

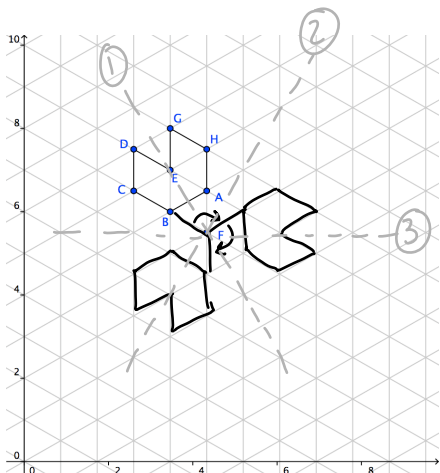


220. Describe any line or rotational symmetry in the larger image.

Identify the type of symmetry that arises from a given transformation on the Cartesian plane

221. Complete the clockwise rotations.

- Rotate the image ABCD 120° about vertex F.
- Rotate the image ABCD 240° about vertex F.

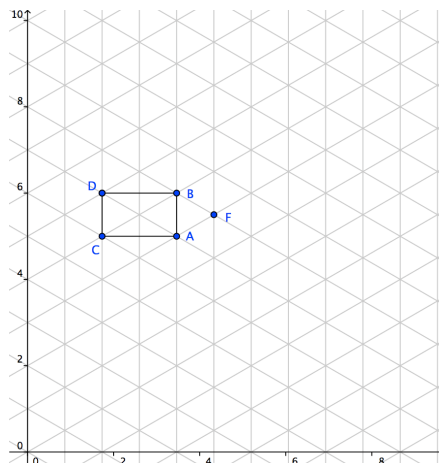


222. Describe any line symmetry or rotationally symmetry that exists.

Rotation symmetry: order 3 with angle of rotation equal to 120 degrees.  
Line of symmetry. There are 3 lines of symmetry.

223. Complete the clockwise rotations.

- Rotate the image ABCD 60° about vertex F five times.

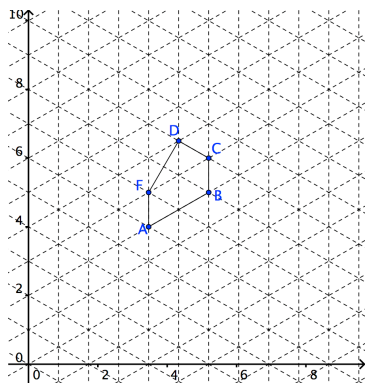


224. Describe any line symmetry or rotationally symmetry that exists.

Describe the symmetry of the larger image created by the multiple rotations.

225. Complete the following clockwise rotations.

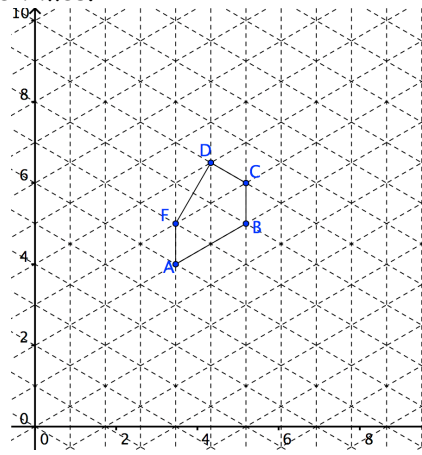
- Rotate the image ABCDF 120° about vertex C.
- Rotate the image ABCDF 240° about vertex C.



226. Describe any lines of symmetry or rotation symmetry.

227. Complete the following clockwise rotations.

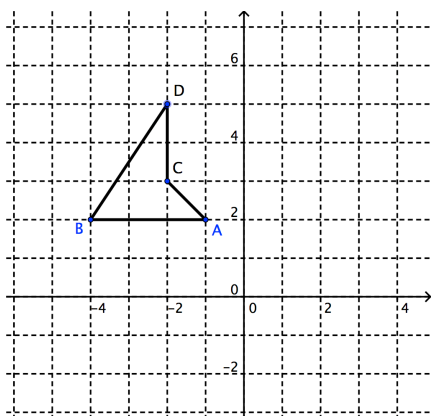
- Rotate the image ABCDF 60° about vertex A five times.



228. Describe any lines of symmetry or rotation symmetry.

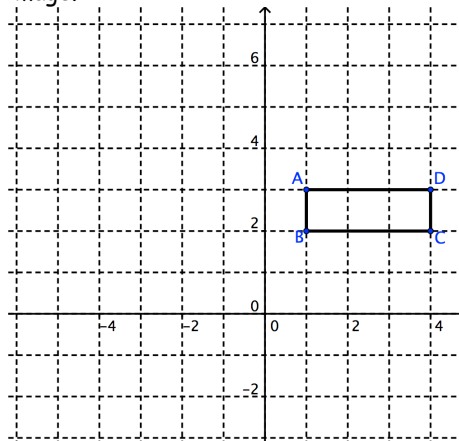
**Challenge #15:**

229. Redraw the image after it has been translated 4 units right and 2 units down. Label the new coordinates A' B' C' D'.



230. Are the two images related by symmetry? Explain how you know?

231. Describe any line symmetry or rotation symmetry between ABCD and each translated image.

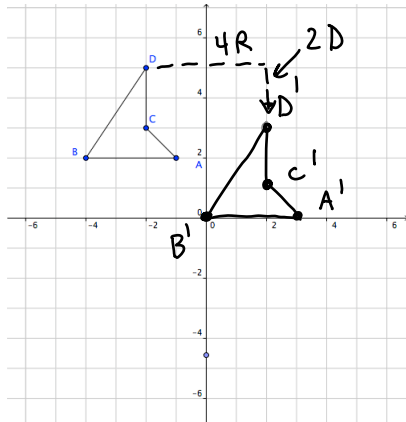


A. Translate ABCD up 3 units. Describe any symmetry?

B. Translate ABCD 5 units left and 5 units down. Describe any symmetry?

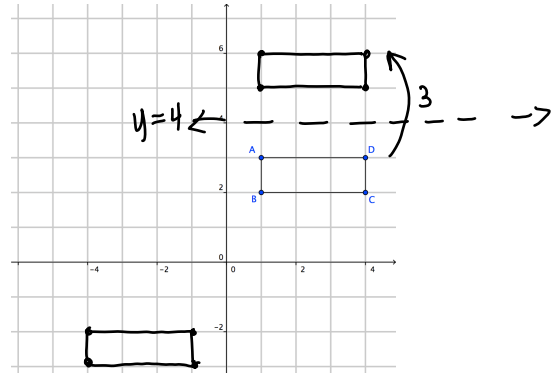
**Identify symmetry in coordinate drawings.**

232. Redraw the image after it has been translated 4 units right and 2 units down. Label the new coordinates A' B' C' D'.



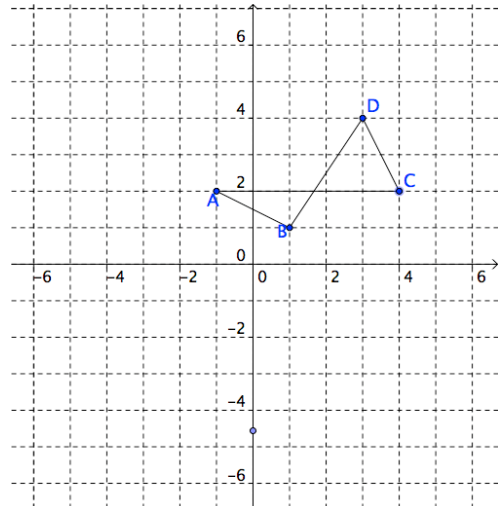
233. Are the two images related by symmetry? Explain how you know? *No. There are no lines of symmetry & there is no point that the object rotated around.*

234. Describe any line symmetry or rotation symmetry between ABCD and each translated image.



- A. Translate ABCD up 3 units. Describe any symmetry? *Reflects over the line  $y=4$ .*
- B. Translate ABCD 5 units left and 5 units down. Describe any symmetry? *It rotates  $180^\circ$  about  $(0,0)$ . If you are not sure place your pencil at  $(0,0)$  & spin your page  $180^\circ$ .*

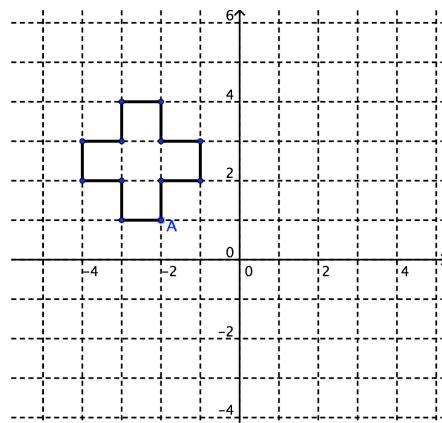
235. Redraw the image after it has been translated 3 units left and 5 units down. Label the new coordinates A' B' C' D'.



236. Is this an example of line symmetry, rotation symmetry or no symmetry? Explain how you know?

237. Describe any line symmetry or rotation symmetry between the polygon and each translated image.

- A. Translate the polygon 5 units down and record the new image. Describe any symmetry?
- B. Reflect the polygon over the y-axis followed by a reflection over the x-axis. Describe any symmetry with the original image?



Recognize Translations.

238. Describe the transformations that occurred to create:

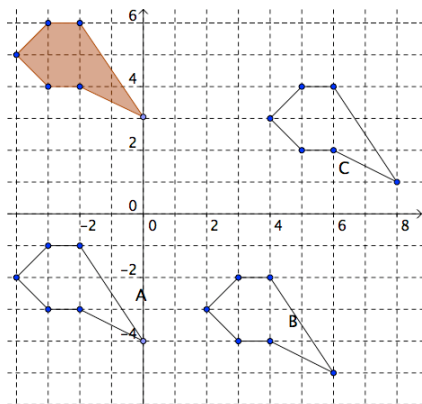


Image A:

Image B:

Image C:

239. Describe the transformations that occurred to create:

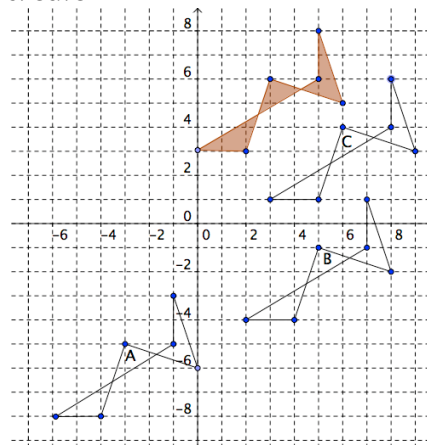


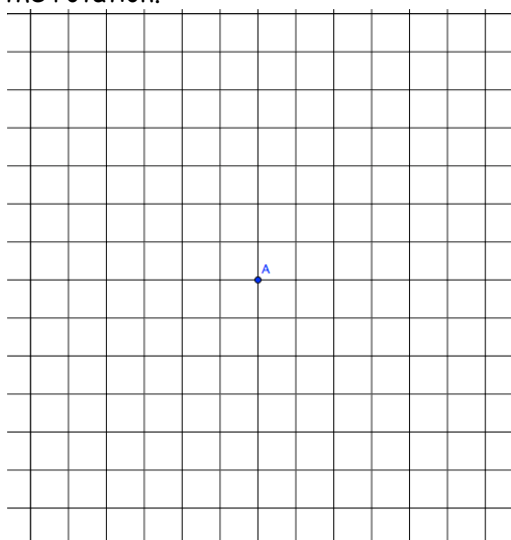
Image A:

Image B:

Image C:

240. Is there any symmetry between the shaded polygon and each translation? Explain how you know.

241. Create a symbol, or modify a symbol that has rotational symmetry. Let point A be the center of the rotation.

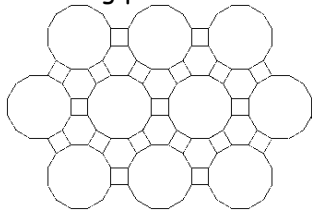


- A. Identify the line(s) of symmetry with dotted line(s).
- B. State the order of rotation:
- C. State the angle of rotation.

Identify a line of symmetry or the order and angle of rotation symmetry in each tessellation. In each picture below, we see only a small piece of the repeating pattern.

242. Sara, Kate and Allison are looking for a tile pattern for their flower shop.

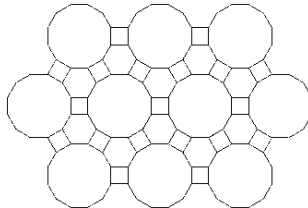
They each decide on the following pattern.



Each made their choice based on the rotational symmetry. Sara says the order is 6. Kate says the order is 2 and Allison says it has order 3.

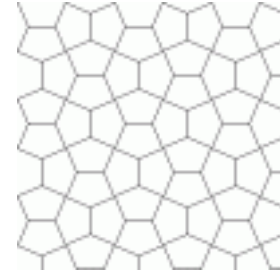
Who is right? Explain.

243. Since Sara, Kate and Allison came to different conclusions about the order of rotational symmetry about the tessellation:



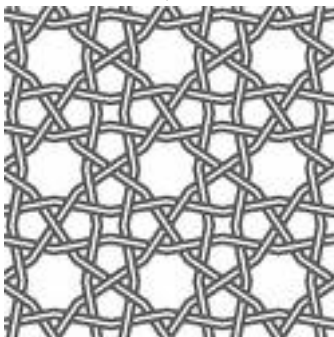
How many different correct answers could there be to the question, "How many lines of symmetry are there?"

244. This is the tile pattern to be used in Sandy's new bathroom floor.

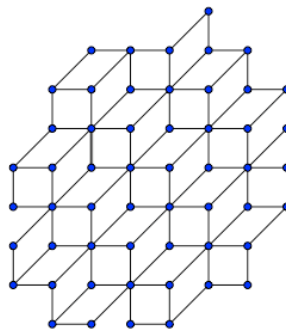


State the largest order of rotation and the corresponding angle of rotation symmetry:

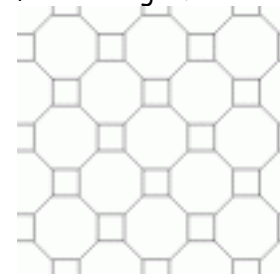
245. From a single point what is the greatest order of rotation symmetry in this tessellation.



246. From a single point what is the greatest number of lines of symmetry in this tessellation.



247. This is a small portion of tiling for the back in a Angie's new kitchen. Let the center of the tessellation be the center of the octagon.



State the order and angle of rotation symmetry:

## Review Check List

Definitions:		Pg #	Face it ☺☹*
Go to page 3 and write down any definitions that you are unsure of.	Define each word and be able to show your understanding with examples.	3	

Learning Target		Pg #	Face it ☺☹
Determine if the polygons in a given pre-sorted set are similar and explain the reasoning.		18	
Draw a polygon similar to a given polygon and explain why the two are similar.	For the given polygon, draw a reduced similar polygon and an enlarged similar polygon in the space provided.	21	
Identify an example in print and electronic media (e.g., newspapers, the Internet) of a scale diagram and interpret the scale factor.	Search the newspaper, magazine or the internet for an example of a scale drawing that is an enlargement.	28	
Draw a diagram to scale that represents an enlargement or reduction of a given 2-D shape		11,	
Determine the scale factor for a given diagram drawn to scale.		5	
Determine if a given diagram is proportional to the original 2-D shape and, if it is, state the scale factor.	Which of the shapes below are proportionate to the shape marked ☺? If the figure is a scale drawing, state the scale.	9	
Solve a given problem that involves a scale diagram by applying the properties of similar triangles	Rita building new roof on her home. She wants a roof that is in a ratio of 7 vertical feet to 12 horizontal feet. She knows the width of her home is 30feet wide. Determine how tall her roof is.	27	
Classify a given set of 2-D shapes or designs according to the number of lines of symmetry	Determine the number of lines symmetry if any found in each picture.	30	
Complete a 2-D shape or design given one half of the shape or design and a line of symmetry	Complete each shape by reflecting it over the each dotted line.	30	
Determine if a given 2-D shape or design has rotation symmetry about the point at the centre of the shape or design and, if it does, state the order and angle of rotation	Determine the order of rotation symmetry and the angle of rotation symmetry for each shape.	36	
Rotate a given 2-D shape about a vertex and draw the resulting image.	Complete the rotations and label the new coordinates.	37	
Identify a line of symmetry or the order and angle of rotation symmetry in a given tessellation.	From a single point what is the greatest number of lines of symmetry in this tessellation.	42	
Identify the type of symmetry that arises from a given transformation on the Cartesian plane.	Describe the location of each line of symmetry to make each polygon a reflection of the shaded polygon.	32	
Complete, concretely or pictorially, a given transformation of a 2-D shape on a Cartesian plane, record the coordinates, and describe the type of symmetry that results.	Describe any line symmetry or rotation symmetry between ABCD and each translated image.	40	
Identify and describe the types of symmetry created in a given piece of artwork.		43	
Determine whether or not two given 2-D shapes on the Cartesian plane are related by either rotation or line symmetry.	Describe any line symmetry or rotation symmetry between ABCD and each translated image.	40	
Draw, on a Cartesian plane, the translation image of a given shape using a given translation rule, such as R <sub>2</sub> , U <sub>3</sub> , label each vertex and its corresponding ordered pair, and describe why the translation does not result in line or rotation symmetry.	Redraw the image after it has been translated 4units right and 2 units down. Label the new coordinates A' B' C' D'.	39	
Create or provide a piece of artwork that demonstrates line and rotation symmetry, and identify the line(s) of symmetry and the order and angle of rotation.	Create a symbol, or modify a symbol that has rotational symmetry. Let point A be the center of the rotation.	41	

\*Face it. When you have mastered the content draw a ☺ OR if you are unsure, draw a ☹ and ask for help.

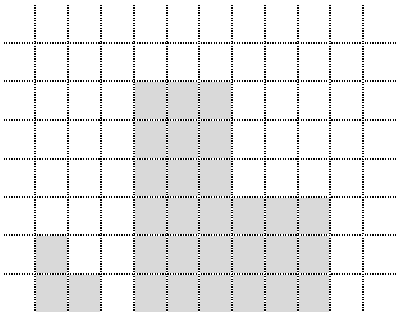
## Practice Test

Score: /30

- Write this test and do not look at the answers until you have completed the entire test.
- Mark the test and decide whether or not you are happy with the result. FACE IT!
- Successful students will go back in the guidebook and review any questions they got wrong on this test.

Correct any errors in the following written expansions.

1. Determine the scale factor for each scale drawing. The original image is on the left.



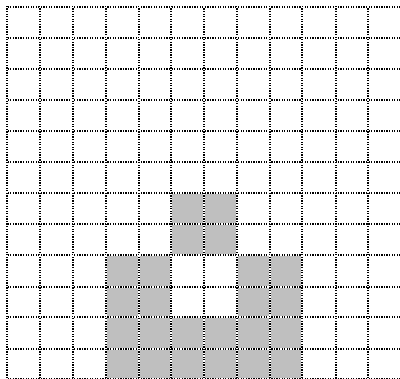
2. A grey nurse shark is 368cm long. National geographic has a photograph of the same shark and it measures 4.8cm long.



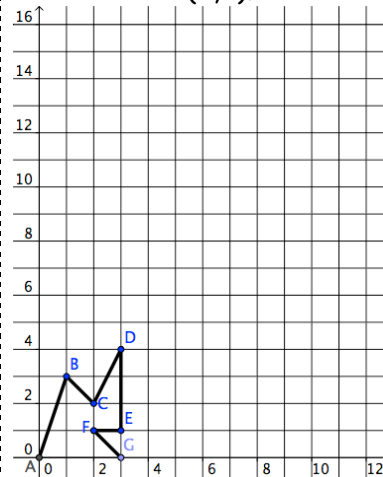
How many times bigger is the real shark compared to the picture? Round your answer to the nearest tenth.

Draw a scale drawing with the given scale factors.

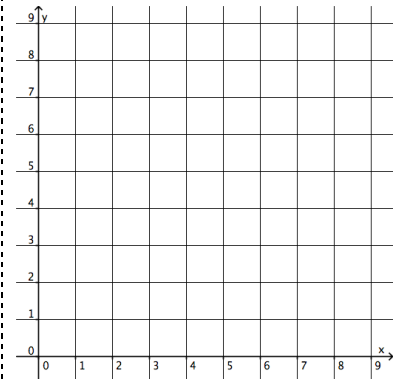
3. Redraw this image below using a scale factor of 0.5



4. Draw a scale diagram of Polygon ABCDEFG with a scale factor of 3 and one vertex at (0,0).



5. Draw  $\triangle ABC$  with vertices  $A(0,0)$ ,  $B(3,0)$  and  $C(2,4)$ .

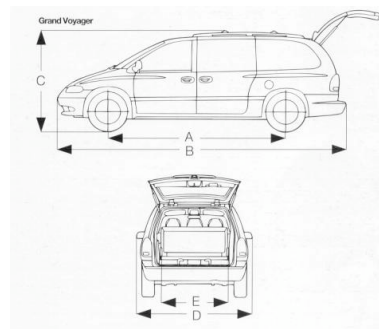


Draw a scale diagram of  $\triangle ABC$  with a scale factor of 2 and one vertex at (0,0).



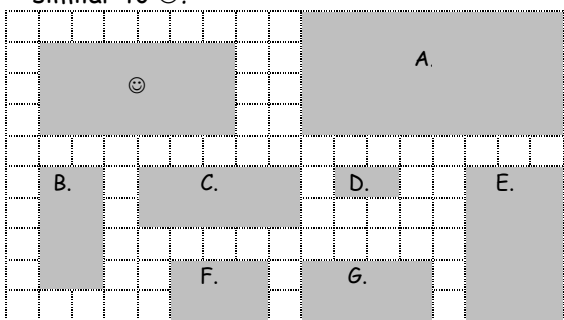
6. A whale shark measures 32m long. Determine the scale factor if it measures 8cm in the photograph.

7. Geevander plans to make a replica of a Grand Voyager. She wants it to be 40 cm long. How tall will it need to be to remain proportionate?

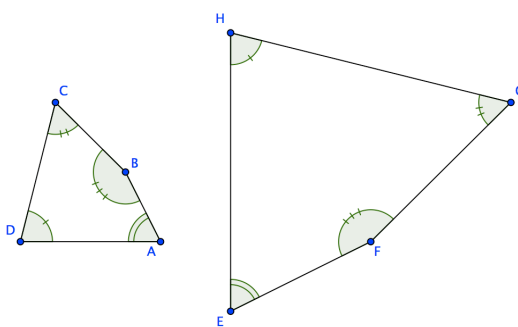


Measurements are in millimeters.  
B= 5070, C= 1740, D= 1950

8. Which of the following rectangles are similar to ☺?

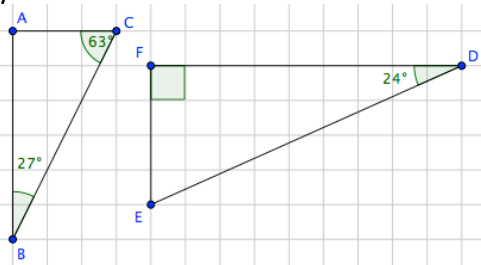


9. Fill in the missing angles and side lengths.



$\angle C = \angle$  \_\_\_\_\_ and

10. Are these triangles similar? Explain how you know.

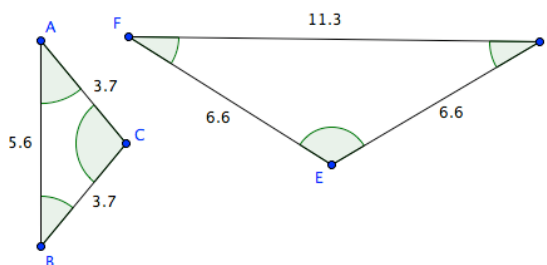


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11. Are these triangles similar? Explain how you know.

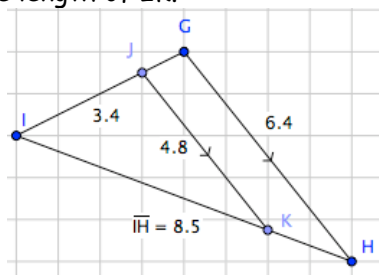


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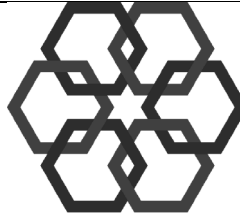
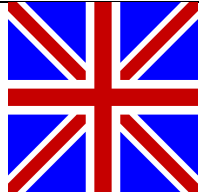
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12. Determine the length of IK.

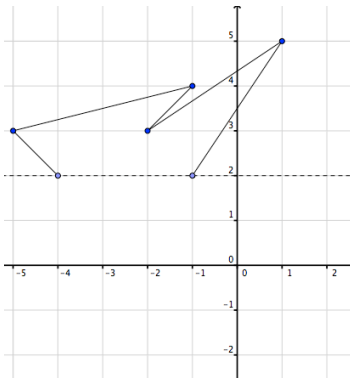


13. Rita is building a new roof on her home. She wants an A-frame roof that is in a ratio of 7 vertical feet to 12 horizontal feet. She knows the width of her home is 44feet wide. Determine how tall her roof will need to be. Round your answer to the nearest tenth.

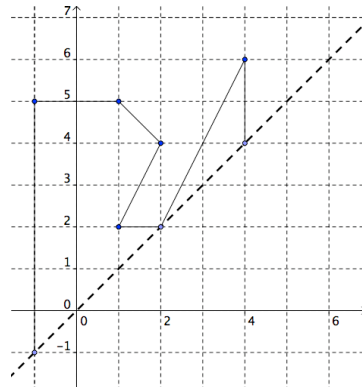
14. Determine the number of lines of symmetry that each image has.



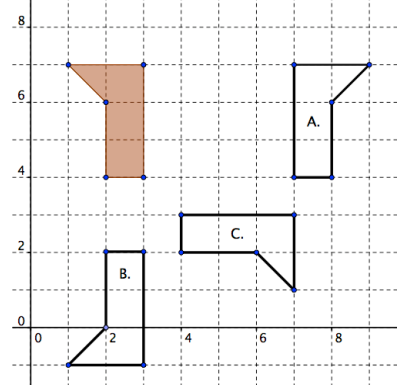
15. Complete each shape by reflecting it over the each dotted line.



16. Complete each shape by reflecting it over the each dotted line.



17. Describe the location of vertical line of symmetry between the shaded object and the image in the top right.



Name the type of symmetry that each word has if any. (Horizontal, Vertical, Rotational or No Symmetry)

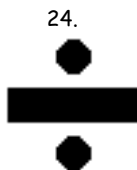
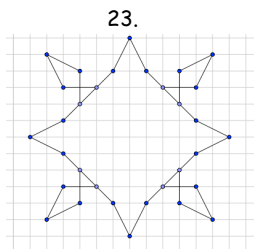
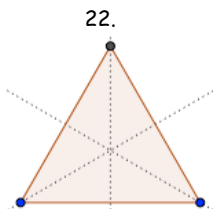
18. SWIMS

19. OBOE

20. HOME

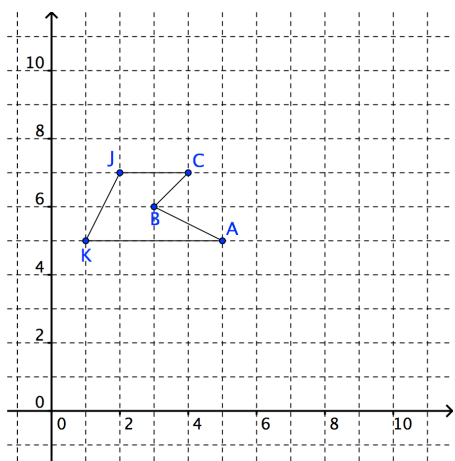
21. MOM

Which of the following have rotational symmetry? If yes, **state the order** of rotation symmetry and **the angle** of rotation.



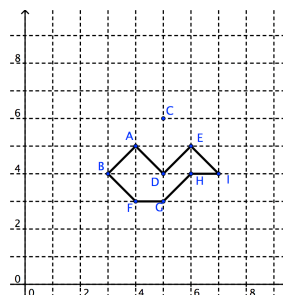
26. Complete the rotations.

Rotate the image ABCJK 180° clockwise about vertex C.



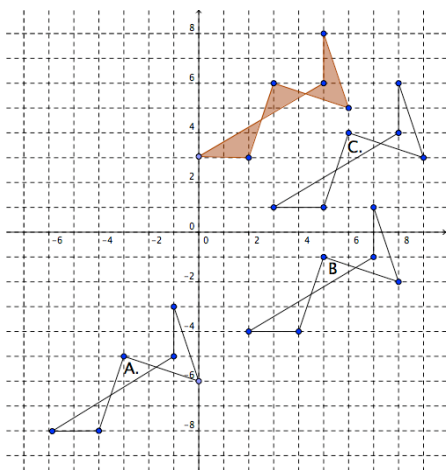
27. Polygon ABDEFGHI is part of a larger shape to be created by the sum of three clockwise rotations.

- Rotate the polygon 90° about point C.
- Rotate the polygon 180° about point C.
- Rotate the polygon 270° about point C.

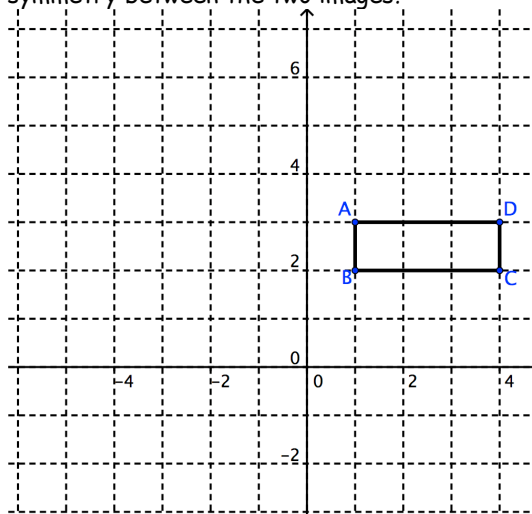


28. Describe any line or rotational symmetry in the larger image.

29. Describe the transformations that occurred to move the shaded image to image A.



30. Translate ABCD 5 units to the left. Describe any symmetry between the two images?

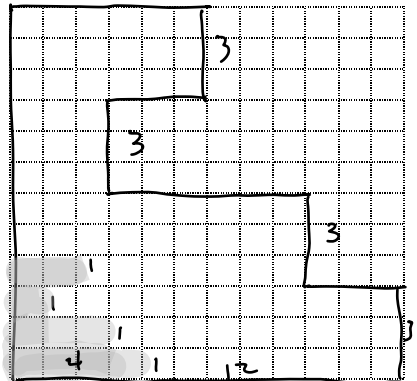


## Similarity Answer Key

AOP=Answered on Page: Detailed solutions available at [www.mathbeacon.ca](http://www.mathbeacon.ca)

- |                  |                 |            |                   |
|------------------|-----------------|------------|-------------------|
| 1. 3             |                 |            |                   |
| 2. $\frac{1}{2}$ | from the        | 7. 0.2 R   | 13. 0.3 R         |
| 3. See #18       | original        | 8. 7 E     | 14. 6.25 E        |
| 4. Divide a side | drawing.        | 9. 0.7 R   | 15. 3             |
| length by a      |                 | 10. 0.02 R | 16. 2             |
| corresponding    | 5. 68.8         | 11. 0.2 R  | 17. $\frac{3}{2}$ |
| side length      | 6. 22.4 cm wide | 12. 0.02 R | 18. AOP           |
|                  | by 136 cm long  |            |                   |

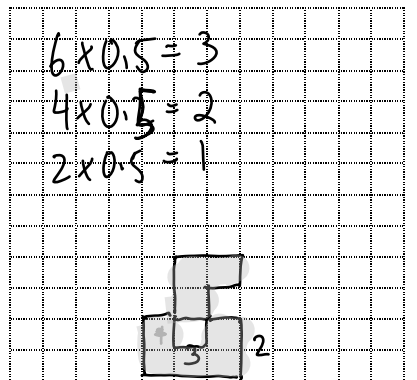
19. Scale factor of 3



Enlargement

- |                          |                    |                   |   |
|--------------------------|--------------------|-------------------|---|
| 20. Enlargement          | 25. 0.01           | 29. 31.05cm       | 33. 2                                     |
| 21. Enlargement          | 26. 2.32           | 30. 23.18cm long  | 34. A. $\frac{3}{2}$ and D. $\frac{1}{2}$ |
| 22. $\frac{1}{2}$        | 27. 275 cm         | by 7.22 cm tall   |   |
| 23. $\frac{2}{5}$ or 0.4 | 28. 22.4cm wide by | 31. $\frac{3}{2}$ |   |
| 24. $\frac{2}{3}$        | 136cm long         | 32. 5             |   |

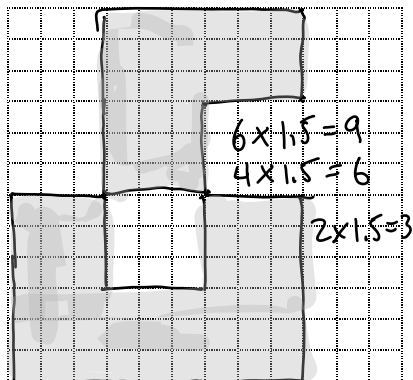
35. Scale factor of 0.5



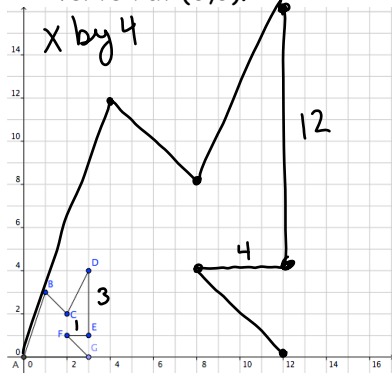
37. Reduction

38. Enlargement

36. Scale factor of 1.5

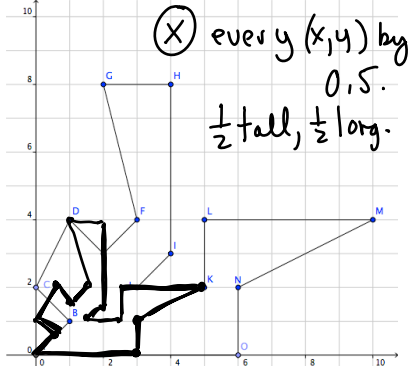


39. Draw a scale diagram of Polygon ABCDEFG with a scale factor of 4 and one vertex at (0,0).



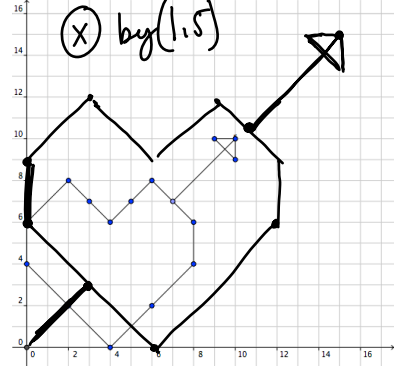
42. 1.5  
43. 2.5

40. Draw a scale diagram of the polygon with a scale factor of 0.5 and one vertex at (0,0).



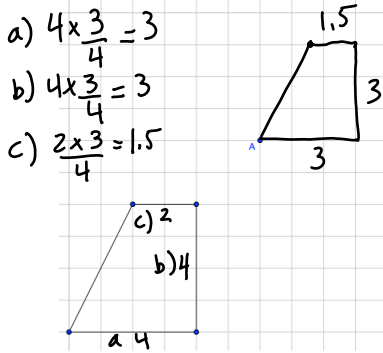
44. B. 2/3 and D. 1/3  
45. 1/2  
46. 1/3

41. Draw a scale diagram of the polygon with scale factor of 1.5 and one vertex at (0,0).

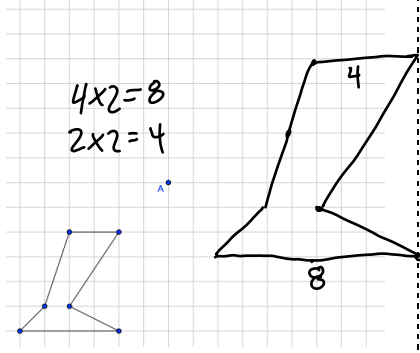


47. See #49  
48. See # 52

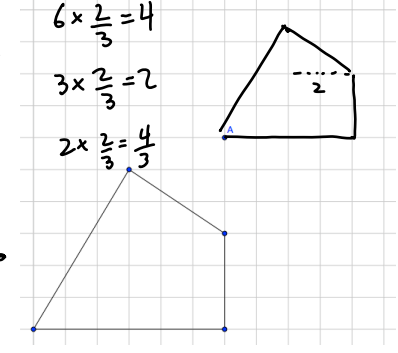
49.



50.



51.

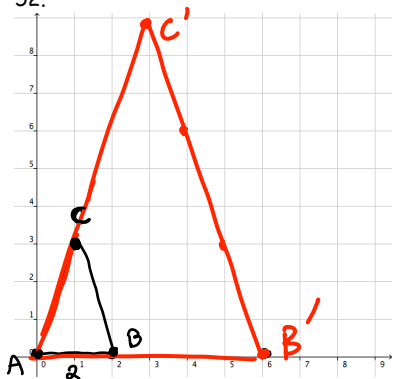


reduction

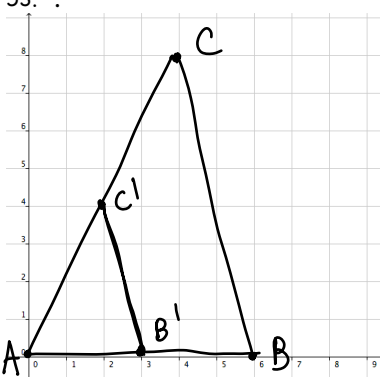
4

Draw a scale drawing on the coordinate plane.

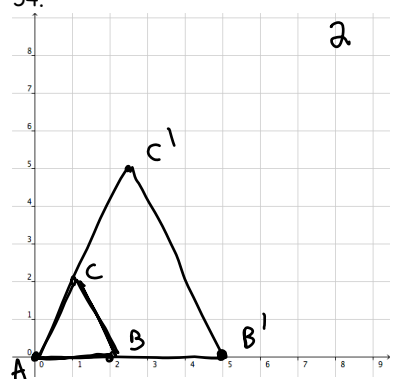
52.



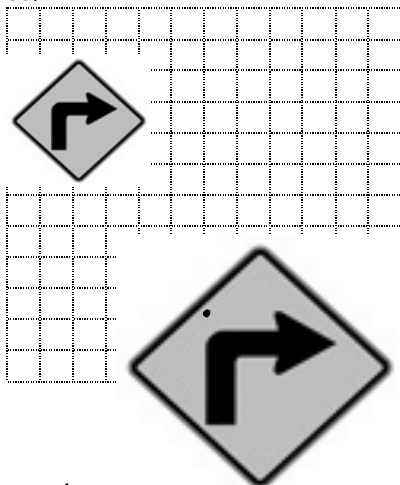
53.



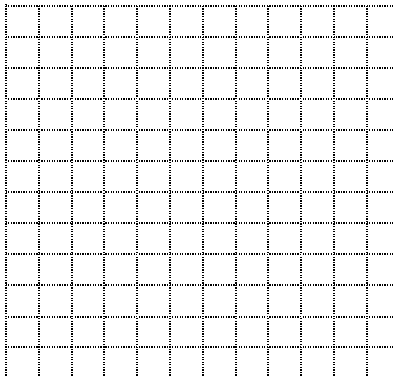
54.



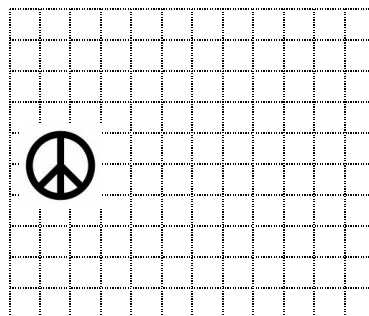
55.



56. Draw the peace symbol with a scale factor of 2.5



57.



58. Answer varies  
Vary

59. 120cm, 1.2m,  
0.0012km

60. 200000mm,  
200m 0.2km

61. 50000mm,  
5000cm,  
0.05km

62. 7000000mm,  
700000cm,  
7000m

63. See #71

64. See#77

65. 56000cm

66. 7.888km

67. 11700m

68. 440mm

69. 37.2m

70. 0.00022km

71. 0.0027

72. 0.0012

73. 0.00000129

74. 5.4/11500 or  
0.0005

75. 0.75

76. 29km

77. 600

78. 5666.7

79. 0.61 cm

80. 1.7mm

81. See #84

82. See #90

83. See # 91

all

by 507.000m  
wide

85. 0.04

86. 7.96cm tall

87. 0.45

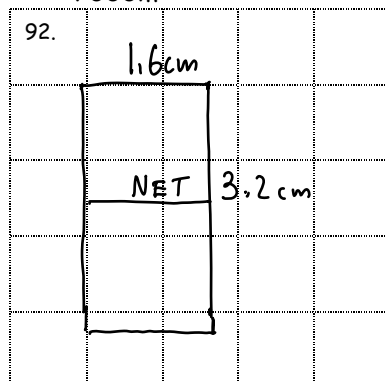
88. 86.93

89. 133.81

90. AOP

91. AOP

92.



93. 0.2cm

94. See [www.mathbeacon.ca](http://www.mathbeacon.ca)  
for solution. The width  
is about 2.5units by  
about 5units.

95. About 2.5cm

96. ABDG

97. 40cm

98. E,F,G,H

99. Ef=EH, FG=GH

100. AOP

101. BCDG

102. 40cm

103. 2.0

104. 4.0

105. 36.0

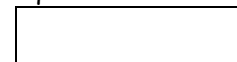
106. 9cm

107. 3.4

108. See 109

109. AOP

110. They are similar  
because the ratios of  
corresponding sides are  
equal.



111. They are not similar because the ratios of corresponding sides are not equal.

112. They are not similar because the ratios of corresponding sides are not equal.

113. Yes. All equilateral triangles have 3 60° angles. Since all corresponding angles are equal, the equilateral triangles are similar.

114. No. Take the two triangles with side lengths 7,7,4 and 7,7,2. They are both isosceles but they are not similar since the ratios of corresponding sides are not equal.

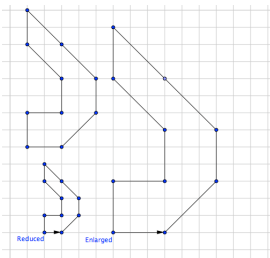
115. E & H. The ratio of base to height is the same. The ratios of corresponding sides are equal.

116. C & H The ratio of base to height is the same. The ratios of corresponding sides are equal.

117. See 119

118. See 123

119. AOP



120.

121. A & C. The ratios of corresponding sides are equal.

122. A, B & C are all similar. The ratios of corresponding sides are equal.

123. AOP

124. Yes. Every side length could be halved but the depressed center could rise rather than dip which would make a different shape.

125. 0.849m

126. 0.947m by 0.687m (To solve: find the I<sub>max</sub> diagonal and compare the ratio of the two diagonals to the ratio of the other dimensions.)

127. See 135

128. See 138

129. IH

130. ED

131. KL

132. AC

133. Yes. Corresponding angles are equal 90,63,27 & 90,63,27

134. No. Corresponding angles are not equal. 90,63,27 & 90, 66 & 24

135. AOP

136. Yes. Corresponding angles are equal

137. Corresponding angles are equal

138. AOP

139. Yes. The ratios of corresponding sides are equal.

140. No. Corresponding angles are not equal. 96,42,42 & 96, 46, 38

141. No. The ratios of corresponding sides are not equal.

142. The ratios of corresponding sides are equal.

143. No. The ratios of corresponding sides are not equal.

144. Yes. Corresponding angles are equal. 90,18,72 & 90,18,72

145. See 147

146. See 153

147. AOP

148. 5.4

149. 8.0

150. 2.3

151. 3.5

152. 3.7

153. 8.8ft tall

154. 16.8m tall

155. 1.76m tall

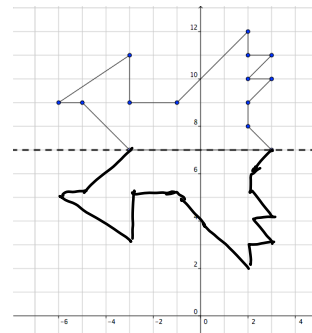
156. 6.00 m tall

157. The house is not in danger. The tree is only 11.5 m tall and the house is 24 m away.

158. 301mm

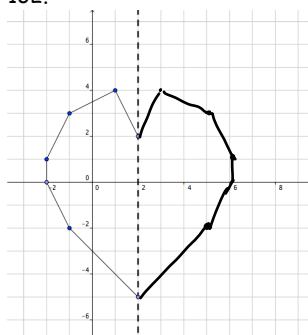
159. Project

160.



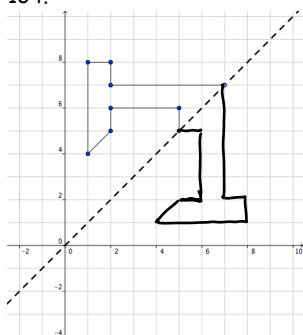
161. The line  $y=7$ .

162.



163. The line  $x=2$ .

164.



165. The line  $y=x$  or the line that goes through  $(0,0)$  and  $(5,5)$

166. 1, 2,4(the square tiles...not the shape of the pineapple) and 6.

167. Answers will vary:

Vertical  $\rightarrow$  BED, BOOK, DECKED, BOOHOOED, CHECK, CHOICE, CODE, DECIDED, DIOXIDE, EXCEEDED, HIDE, ICEBOX, OBOE. Horizontal Symmetry  $\rightarrow$  OTTO, MAAM, TOOT. MOM, WOW, AHA, AIA, AMA, AVA, AWA, HAH, HOH, HUH, MAM, MIM, MUM, OHO, OXO, TAT, TOT, TUT, UTU, VAV, and WAW.

168. 0,1,3,4

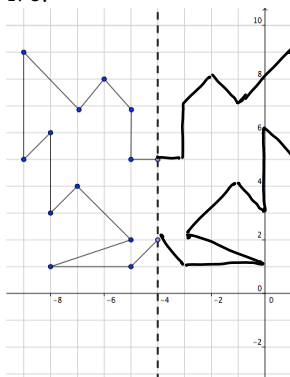
169. 4,0,1,2

170. 6,1,5,1

171. H, V, NONE, V

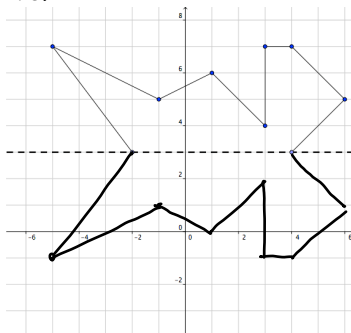
172. V, NONE, H, NONE

173.



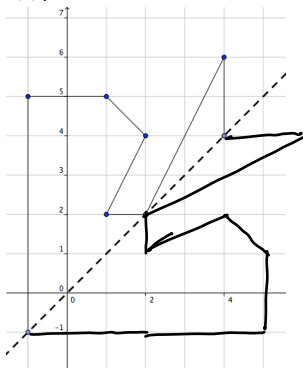
174. The line  $x=-4$

175.



176. The line  $y=3$

177.



178. The line  $y=x$  or the line through  $(0,0)$  and  $(5,5)$ .

179.  $(-2,2)$ ,  $(-4,4)$ ,  $(0,3)$

180.  $(2,-2)$ ,  $(4,-4)$ ,  $(0,-3)$

181.  $(-2,2)$ ,  $(-4,4)$ ,  $(-1,3)$ ,  $(-3,5)$

182.  $(2,4)$ ,  $(4,6)$ ,  $(3,3)$ ,  $(5,5)$

183. See 185

184. See 189

185. AOP

186.  $x=2$ ,  $y=x$ ,  $y=-1$

187. Reflect over  $x=-2$  and then  $y=0$ . OR Reflect over  $y=0$  and then  $x=-2$ .

188.  $X=-1 \rightarrow y=2$  or  $y=2 \rightarrow x=-1$

189. AOP

190.  $X=-1$  followed by  $x=2$ . C) Translate 6 units right.

191. Be creative

192. Y,Y,N,Y

193. N,Y,Y,Y

194. Y,Y,Y,Y

195.  $90^\circ$

196. 4 times,  $90^\circ$ ,  $180^\circ$ ,  $270^\circ$  &  $360^\circ$

197. OXO, MOW, WIM, NON, SOS (S.O.S.Acronym)

198. 7,  $51.4^\circ$

199. 15,  $24^\circ$

200. 50,  $7.2^\circ$

201. 5

202. 6

203. 1

204.  $90^\circ$

205.  $120^\circ$

206.  $180^\circ$

207. 14,  $51.4^\circ$ , 12

208. V,R,H,H

209. R,V,NONE,R

210. (H,R,V),NONE,V,NONE

211. See 217

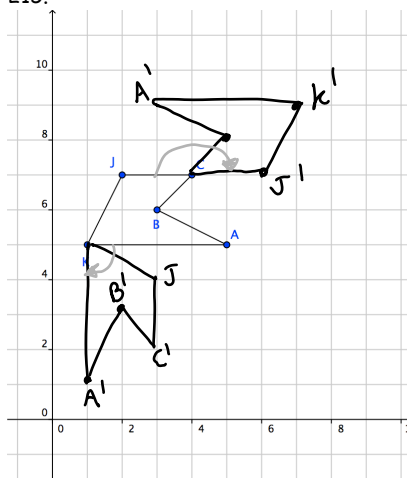
212. See 218

213. See 221

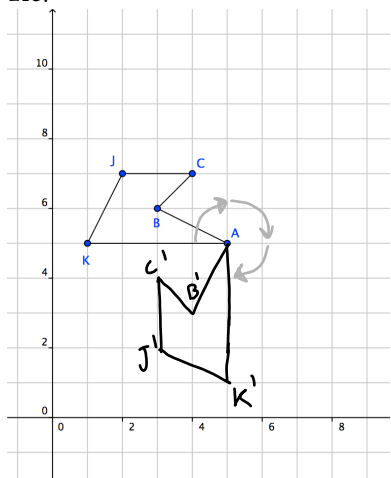
214. See 222



215.



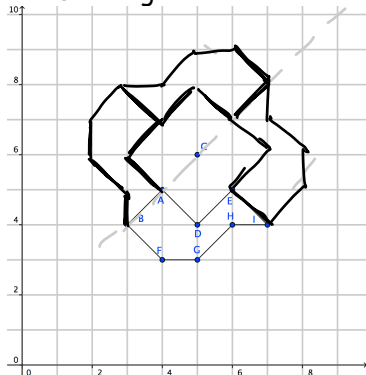
216.



217. AOP

218. AOP

219. Drawing



220. No line symmetry with rotation symmetry of

order 4.

221. AOP

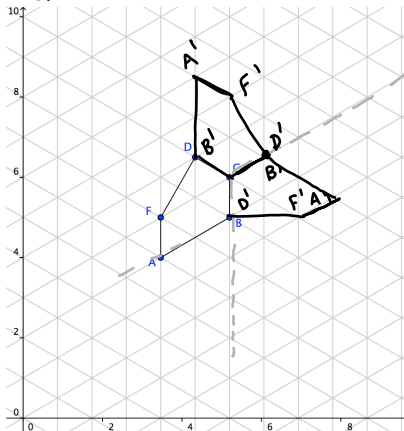
222. AOP

223. See [www.mathbeacon.ca](http://www.mathbeacon.ca)

for the drawing.

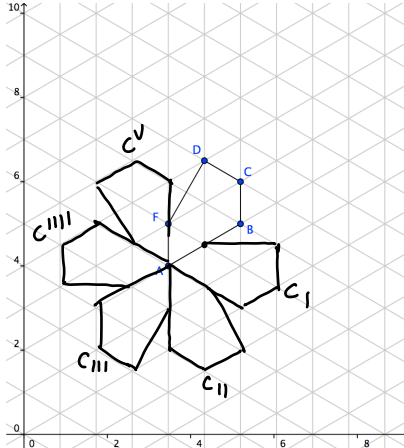
224. Line Symmetry with 6 lines and rotation symmetry of order 6.

225.



226. No line, Rotation Symmetry of order 3

227.



228. No line, Rotation Symmetry of order 6

229. See 232

230. See 233

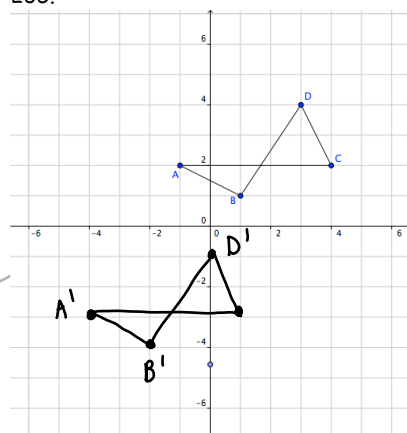
231. See 234

232. AOP

233. AOP

234. AOP

235.



236. No symmetry at all. There are no reflections and there is no central point by which the image was spun.

237. A. Reflect over the line  $y=0$ , B. Reflect over the line  $y=x$  and rotation symmetry with angle of rotation of  $180^\circ$

238. 7down, 8 down and 6 right, 8 right and 2 down (The order in each pair can be reversed.)

239. 6 left and 11 down, 7down and 2 right, 3 right and 2 down (The order in each pair can be reversed.)

240. There is no line symmetry and no rotational symmetry.

241. Be creative.

242. They all could be right depending on the center point they choose.

243. 6 lines, 3 lines or 2 lines depending on where you draw the lines.

244. Order 2 with angle of rotation of  $180^\circ$

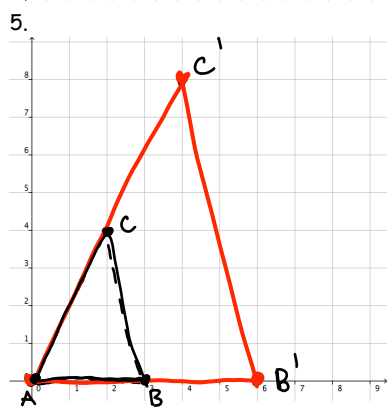
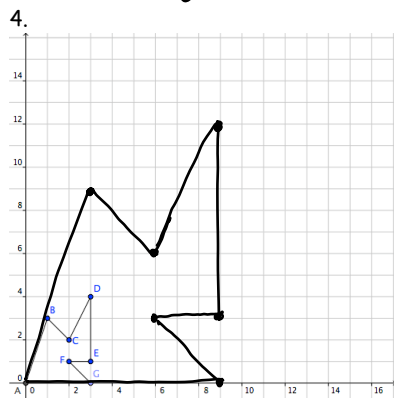
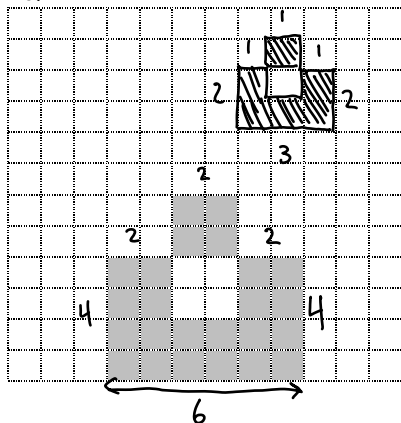
245. 4 lines

246. 2 lines of symmetry

247. The order of rotation is 4 with an angle of rotation of  $90^\circ$

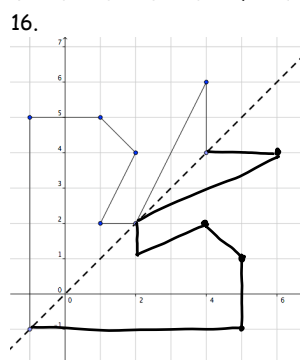
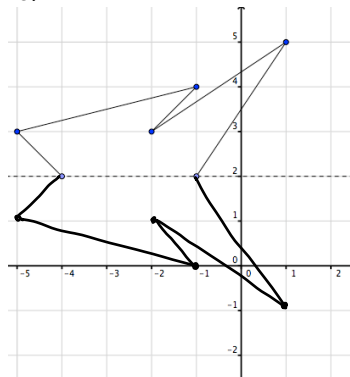
Similarity Answer Key

1. 3
2. 76.7 times bigger
- 3.

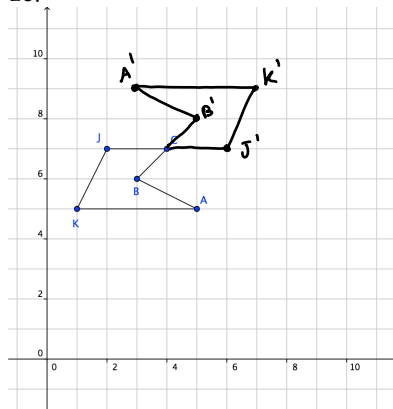


6. 0.0025 or 1/400
7. 137.3mm tall
8. A,B,D,G
9. G, EF, EH
10. NO. The corresponding angles are not equal
11. NO. The ratios of corresponding sides are not equal.
12. 6.375

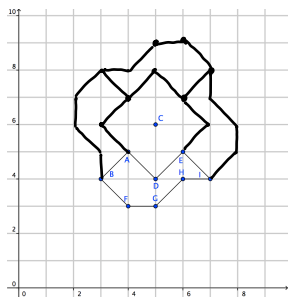
13. 12.8feet tall
14. 1,4,6,None
- 15.



17.  $x=5$
18. Rotation
19. Vertical
20. None
21. Horizontal
22. Yes, Order 3, angle of rotation is  $120^\circ$
23. Yes, Order 4, angle of rotation is  $90^\circ$
24. Yes, Order 2, angle of rotation is  $180^\circ$
25. No
- 26.



27.



28. No line symmetry. Rotation symmetry of order 4, angle of rotation is  $90^\circ$

29. 6 left and 11 down

30. Reflection over the y-axis and  $180^\circ$  rotation around the point (0,2.5)