Similarity and Transformations

This booklet belongs to:_____

LESSON #	DATE	QUESTIONS FROM NOTES	Questions that I find difficult
1.		Pg.	
2.		Pg.	
3.		Pg.	
4.		Pg.	
5.		Pg.	
6.		Pg.	
7.		Pg.	
8.		Pg.	
9.		Pg.	
10.		Pg.	
11.		REVIEW	
12.		TEST	

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Your teacher has important instructions for you to write down below.

**Unless otherwise stated, round your final answer to one decimal place.**

_____

_____

Similarity and Transformations

IRP	#	Daily Topic	Key Ideas
C3 Demonstrate an understanding of similarity of polygons. [C, CN, PS, R, V] C4 Draw and interpret scale diagrams of 2-D shapes. [CN, R, T, V]	1.	Scale Drawings (pg. 4-8) • Determine the scale factor for a given diagram drawn to scale.	
	2.	Scale Drawings Con't (pg. 8-11) • Determine if a given diagram is proportional to the original 2-D shape and, if it is, state the scale factor. • Draw a diagram to scale that represents an enlargement or reduction of a given 2-D shape	
	3.	Applying scale drawings (pg. 12-16) •	
	4.	Extra Day for Scale drawings •	
	5.	Similar polygons (Pg. 17-22) • Determine if the polygons in a given pre-sorted set are similar and explain the reasoning. • Draw a polygon similar to a given polygon and explain why the two are similar.	
	6.	Similar Triangles (Pg. 23-28) • Solve a given problem that involves a scale diagram by applying the properties of similar triangles • Identify an example in print and electronic media (e.g., newspapers, the Internet) of a scale diagram and interpret the scale factor.	
C5 Demonstrate an understanding of line and rotation symmetry. [C, CN, PS, V]	7.	Line Symmetry (Pg. 29-33) • Classify a given set of 2-D shapes or designs according to the number of lines of symmetry • Complete a 2-D shape or design given one half of the shape or design and a line of symmetry • Identify the type of symmetry that arises from a given transformation on the Cartesian plane.	
	8.	Rotational Symmetry (Pg. 34-37) • 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. • Rotate a given 2-D shape about a vertex and draw the resulting image.	
	9.	Rotational Symmetry con't (Pg. 38-42) • 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. • Determine whether or not two given 2-D shapes on the Cartesian plane are related by either rotation or line symmetry. • Draw, on a Cartesian plane, the translation image of a given shape using a given translation rule, such as R2, U3, label each vertex and its corresponding ordered pair, and describe why the translation does not result in line or rotation symmetry. • 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.	
	10.	Chapter Review and Practice Test • Help students develop sound study habits. • Many students will graduate high school saying they do not know how to study for math tests. •	
	11.	Go over Practice Test	
	12.	Unit Evaluation	

Key Terms

	Definition	Example
Angle of rotation symmetry	The smallest angle needed for a shape to rotate to match itself.	
Cartesian plane	A two dimensional surface made up of coordinates. The vertical axis is called the y- axis and the horizontal axis is called the x-axis.	
Corresponding angles	Angles that match in similar polygons.	
Corresponding lengths	Side lengths that match in similar polygons.	
Corresponding sides	Sides that match in similar polygons.	
Order of rotation	The number of times a shape matches itself during a rotation of 360°.	
Polygon	A closed shape. i.e. triangle, circle…	
Proportion	Having the same ratio.	
Rotational symmetry	The property of a shape where it can rotate less than 360° and match itself.	
Scale drawing	A drawing that is an enlargement or a reduction of another drawing.	
Scale factor	The common number that is used to multiply or divide side lengths to create a similar polygon.	
Similar Polygons	Two polygons with the same shape and • Equal corresponding angles • Equal ratio of pairs of corresponding sides	

Scale Drawings
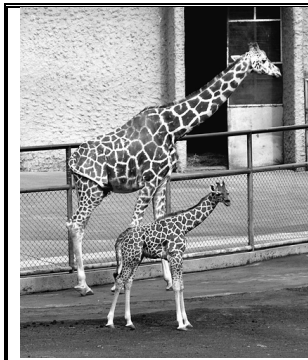
How many times larger does the taller giraffe look compared to the smaller one?

The answer to question above is called the scale factor.
- If an object is 5 times bigger then the scale factor is 5.
- If an object is half as big then the scale factor is 0.5.
- If a scale drawing is 4cm long and the actual length is 400cm then the scale factor would be 1/100.

Challenge #1:

1. Determine the scale factor for each scale drawing. The original image is on the left.
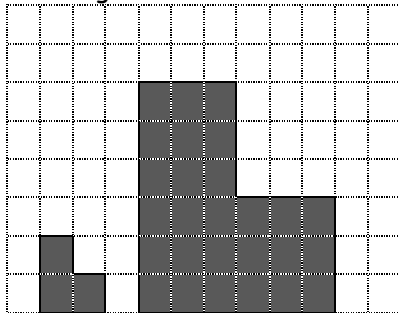
2. Determine the scale factor for each scale drawing. The original image is on the left.
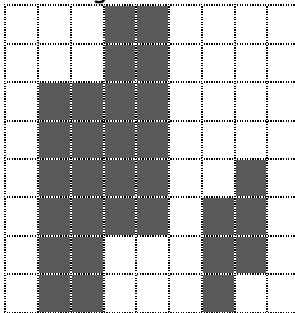
3. Draw the figure below with a scale factor of 2. Is this an enlargement or a reduction?
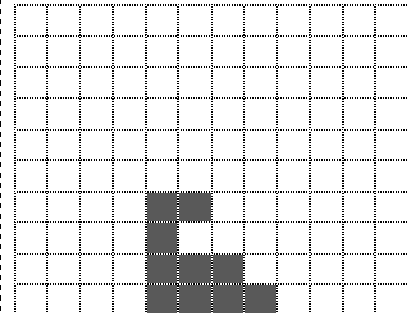
4. Explain how you can find the scale factor for any two objects.

Challenge #2:

5. A grey nurse shark is 358cm long. National geographic has a photograph of the same shark and it measures 5.2cm long. How many times bigger is the real shark compared to the picture?

6. James is creating replica of a Bell 412 rescue helicopter from a photograph with a width of 2.8cm and a total length of 17cm. Determine the new dimensions if the scale factor is 8.

Definitions

Proportionate: Having a constant ratio to another quantity.
Scale Drawing: • A drawing that is proportionate to another drawing. • This means that corresponding pairs of side lengths are equal. **Scale Factor:** • The common number that is used to multiply or divide side lengths to create a similar polygon. **Reduction:** • Creates a smaller image. • The scale factor for reductions is between 0 and 1. **Enlargement:** • Creates a larger image. • The scale factor for enlargements is greater than 1.

Write each scale factor as a decimal and state whether it will create an enlargement or a reduction.
(Round your answer to 2 decimal places)

7. $\dfrac{200}{1000}$	8. $\dfrac{350}{50}$	9. $\dfrac{140}{200}$	10. $\dfrac{20}{1000}$
11. $\dfrac{25}{125}$	12. $\dfrac{80}{4000}$	13. $\dfrac{900}{3000}$	14. $\dfrac{500}{80}$

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

15.

Scale factor $= \dfrac{6}{2} = 3$

2   6

3 times Bigger

16.

17.
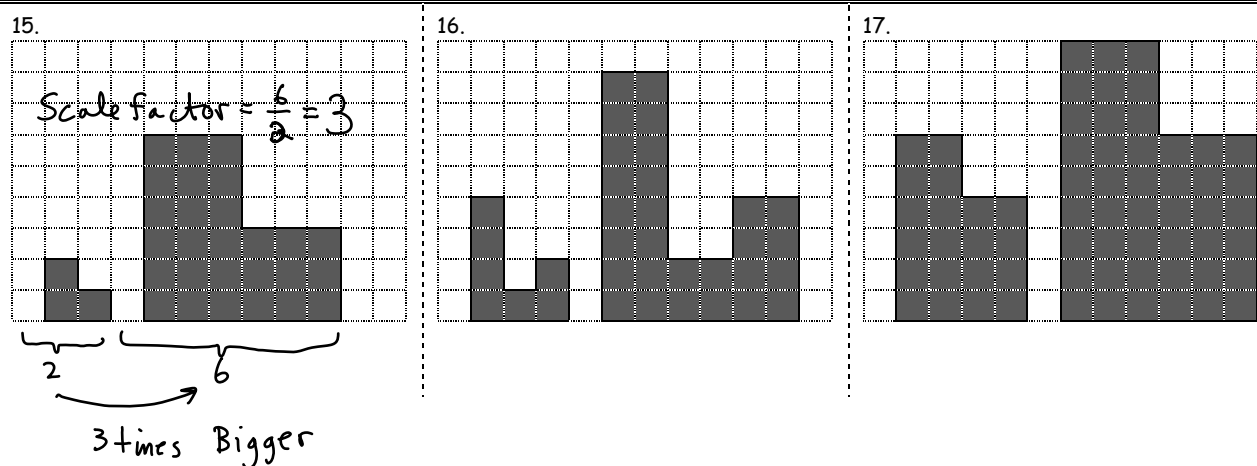
Redraw the original drawing with the given scale factors:

Original image	18. Scale factor of 2	19. Scale factor of 3
	This is an answer to challenge number 1:3	
	20. Is this an enlargement or a reduction? *This is an enlargement by 2.*	**21.** Is this an enlargement or a reduction?

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

22. $Scale factor = \frac{3}{6} = \frac{1}{2}$

6
2 3
1
2   1
4   2

23.

24.

Determine the scale factor or the actual size. Round your answer to 2 decimal places.

25. A grey nurse shark is 358cm long. National geographic has a photograph of the same shark and in the picture the shark measures 5.2cm. Determine the scale factor.	26. A drawing of a bedbug is 2.2cm long. The actual size is 0.95cm. Determine the scale factor.	27. This is a picture of a prehistoric scorpion. The drawing measures at 2.5 centimeters long. If the scale factor is 1/110, determine the actual length of a prehistoric scorpion.
Photo = 5.2 cm $\frac{5.2}{358}$ Real life = 358 Scale factor = 0.01		

Determine the scale drawings dimensions. (Round your answer to 2 decimals)

28. James is creating replica of a Bell 412 rescue helicopter from a photograph with a width of 2.8cm and a total length of 17cm. Determine the new dimensions if the scale factor is 8.

Photo ⟶ Replica
2.8cm × 8 = 22.4cm
17cm × 8 = 136 cm
The new dimensions are 22.4cm wide & 136cm long.

29. Vince is creating a replica of an AW 139 rescue helicopter from a photograph with a blade diameter of 13.8cm. How long will the replica blade length be if the scale

factor is [ ] ?

30. In the photo the wingspan of Boeing 777 is 6.1cm long and the height of the plane is 1.9cm tall. Randal plans to make a replica using a scale factor of 3.8. Determine the new dimensions.

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

31.
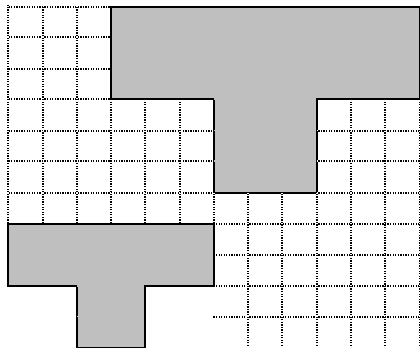
32.
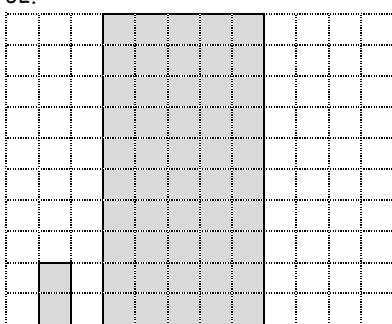
33.
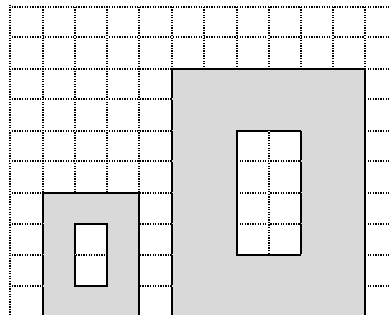
Proportionate drawings

34. Which of the shapes below are proportionate to the shape marked ☺? If the figure is a scale drawing, state the scale.
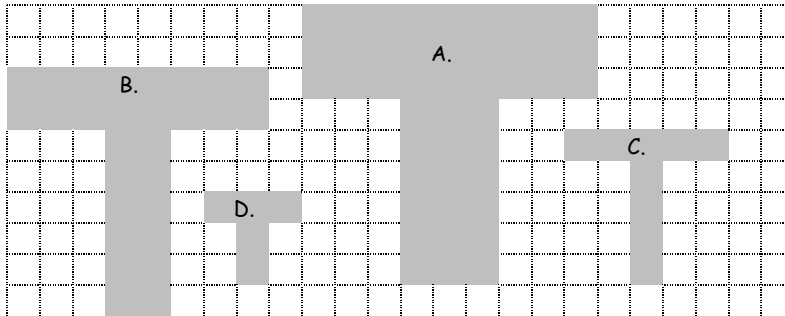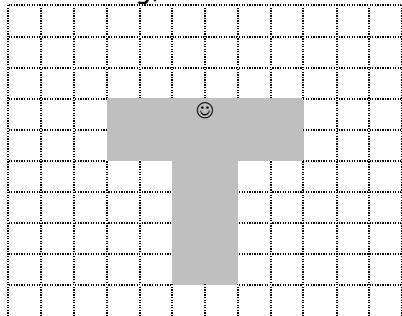
Draw a scale drawing with the given scale factors.
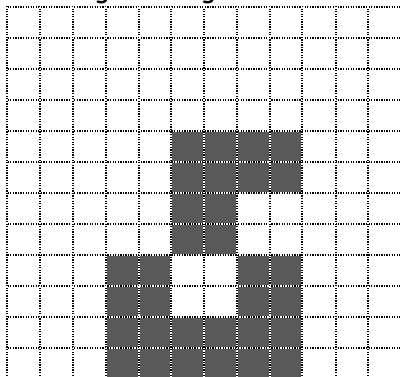
Original image	35. Scale factor of 0.5	36. Scale factor of 1.5
	37. Is this an enlargement or a reduction?	38. Is this an enlargement or a reduction?
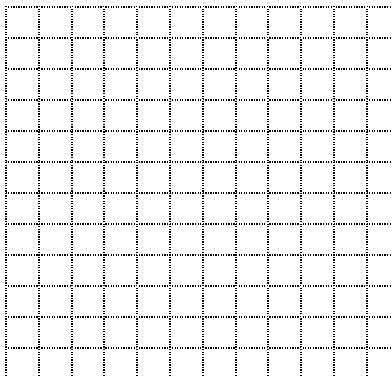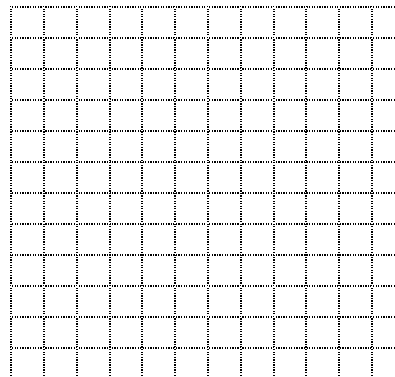
Complete the scale drawing.

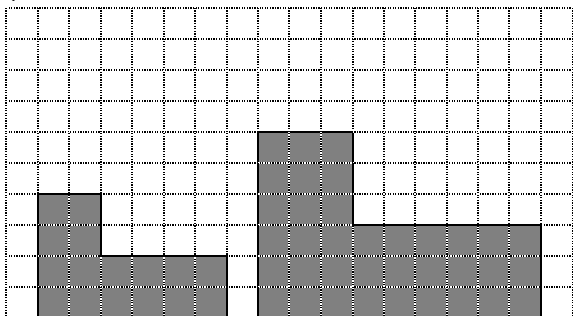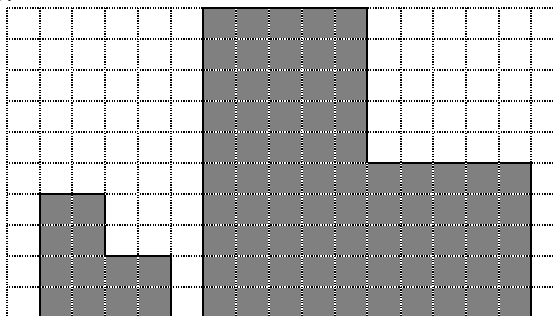| 39. Draw a scale diagram of Polygon ABCDEFG with a scale factor of 4 and one vertex at (0,0).	40. Draw a scale diagram of the polygon with a scale factor of 0.5 and one vertex at (0,0).	41. Draw a scale diagram of the polygon with scale factor of 1.5 and one vertex at (0,0).
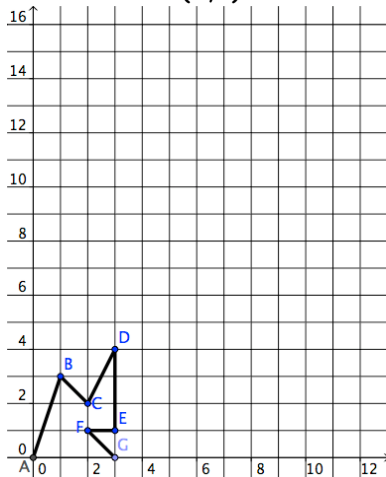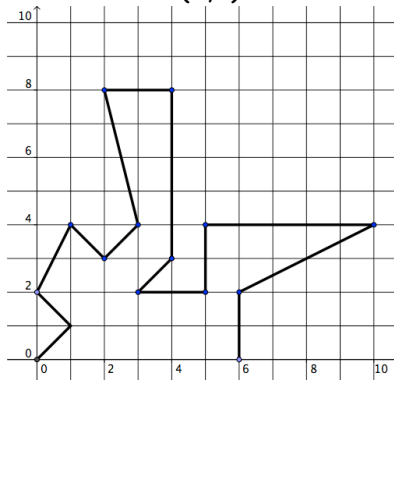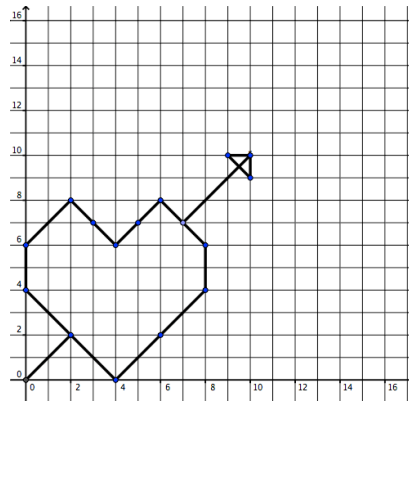
Determine the scale factor for each scale drawing. The original is on the left

42.

43.

Proportionate drawings.

44. Which of the shapes below are proportionate to the shape marked ☺? If the figure is a scale drawing, state the scale.
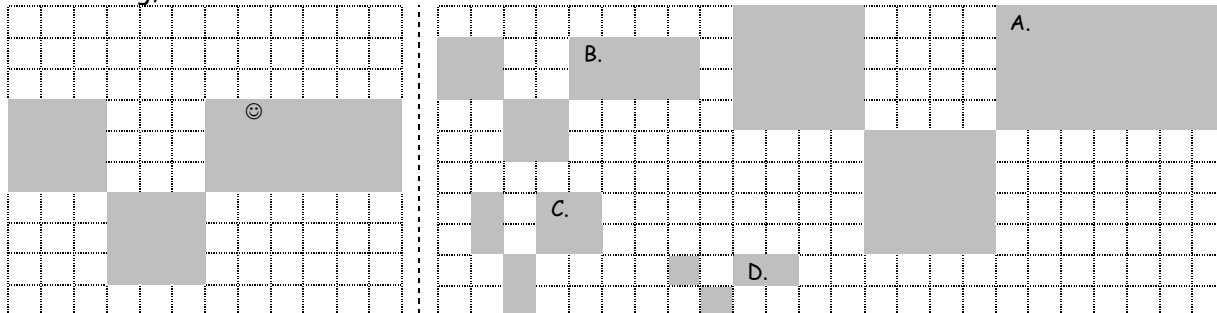
Determine the scale factor for each scale drawing. The original is on the left
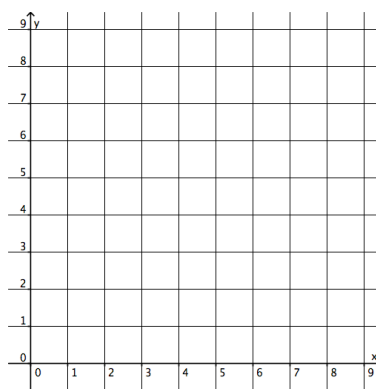
45.
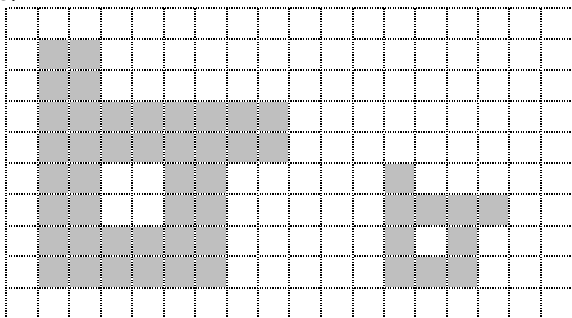
46.
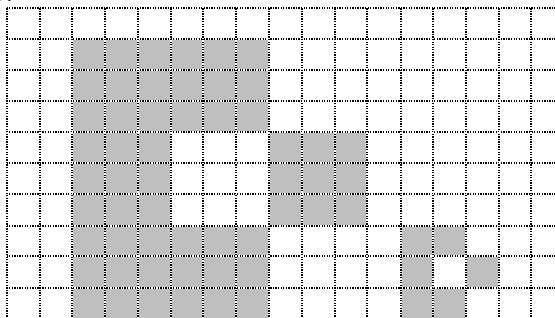
Challenge #3:

47. Draw the following polygon beginning at point A with a scale factor of 3/4.
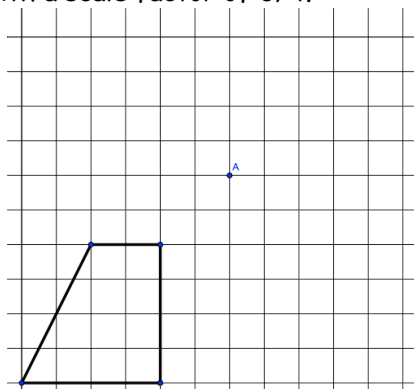
Is this an example of an enlargement or a reduction?
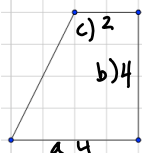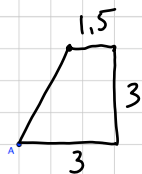
48. Draw ΔABC with vertices A(0,0), B(2,0) and C(1,3).

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

9

Reductions and enlargements

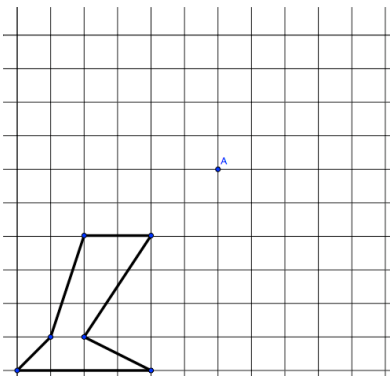**49.** Draw the following polygon beginning at point A with a scale factor of $\frac{3}{4}$.

a) $4 \times \frac{3}{4} = 3$

b) $4 \times \frac{3}{4} = 3$

c) $\frac{2 \times 3}{4} = 1.5$
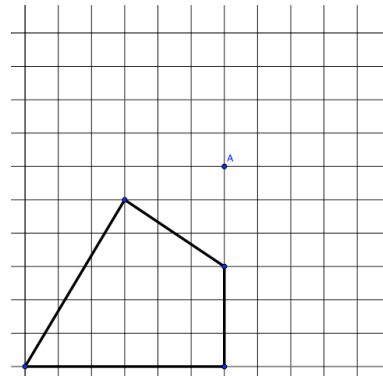
Is this an example of an enlargement or a reduction?

Reduction.

50. Draw the following polygon beginning at point A with a scale factor of 2.

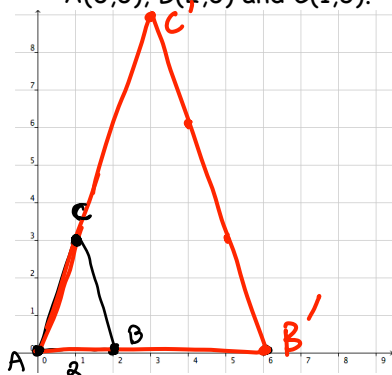Is this an example of an enlargement or a reduction?

51. Draw the following polygon beginning at point A with a scale factor of 2/3.
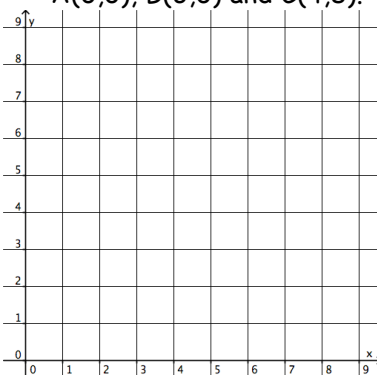
Is this an example of an enlargement or a reduction?

Draw a scale drawing on the coordinate plane.

52. Draw △ABC with vertices A(0,0), B(2,0) and C(1,3).
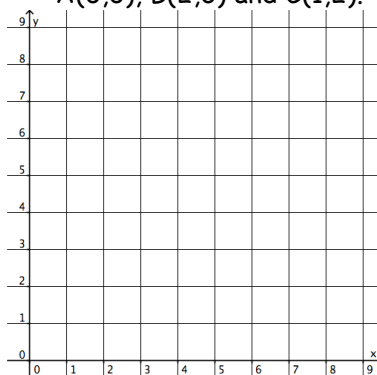
Draw a scale diagram of △ABC on the same grid with a scale factor of 3 and one vertex at (0,0). $AB = 2 \times 3 = 6$

Point $= (1,3) \Rightarrow (3,9)$

53. Draw △ABC with vertices A(0,0), B(6,0) and C(4,8).

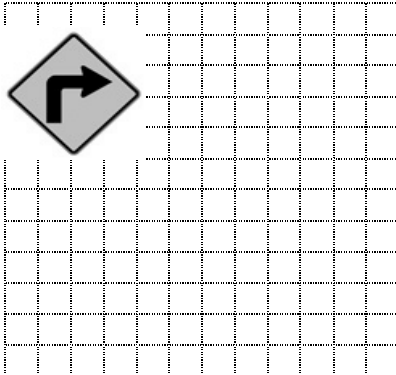Draw a scale diagram of △ABC on the same grid with a scale factor of 0.5 and one vertex at (0,0).
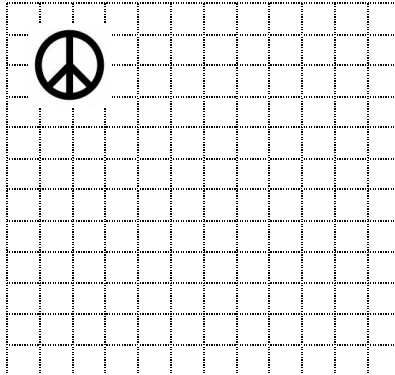
54. Draw △ABC with vertices A(0,0), B(2,0) and C(1,2).

Draw a scale diagram of △ABC on the same grid with a scale factor of 2.5 and one vertex at (0,0).
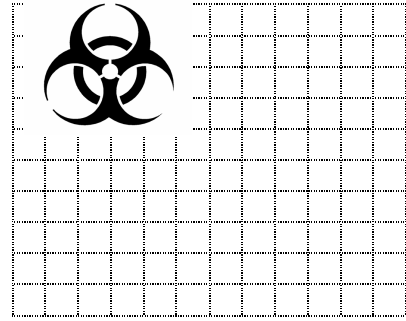
Create a scale drawing.

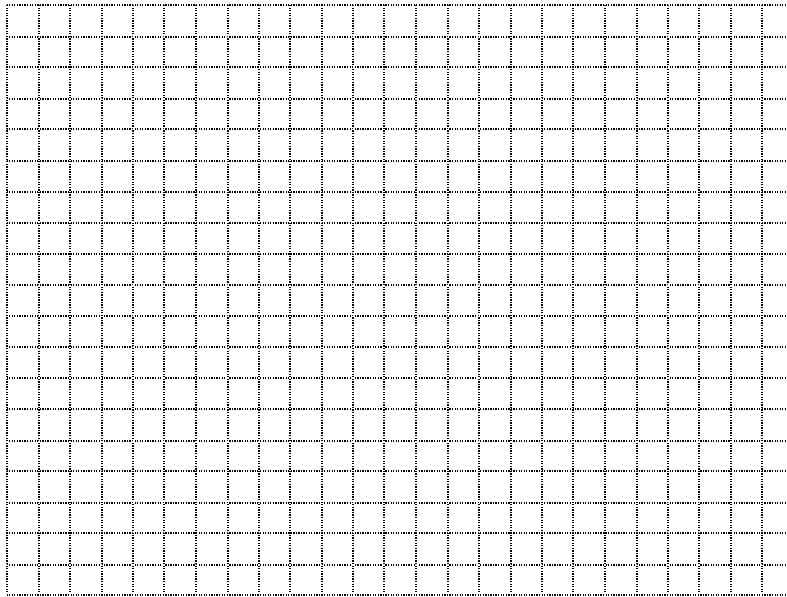**55.** Draw the traffic symbol with a scale factor of 2.

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

57. Draw biohazard symbol with scale factor of 0.5.

58. Draw a scale drawing of your dream bedroom. Show as much detail including furniture as you can.

A. What scale factor did you choose?

B. State the actual dimensions of your room?

C. What are the scale dimensions of your room?

D. State the actual width of your door?

E. What is the scale width of your door?

Applications of Scale Drawings

Notes:

_____

_____

Challenge #4: Fill out the table.

	Millimeters	Centimeters	Meters	Kilometers
59.	1200mm	A.	B.	C.
60.	A.	20000cm	B.	C.
61.	A.	B.	50m	C.
62.	A.	B.	C.	7km

*1 km = 1000m, 1 m=100cm and 1cm=10mm.

Challenge #5:

63. A whale shark measures 30m long. Determine the scale factor if it measures 8cm in the photograph.	64. This is a dust mite and it eats your dead skin. It is 27mm in this picture. Its actual length is 0.045mm. Determine the scale factor.

Conversions.

65. Convert 0.56km to cm. Possible solution: 0.56km→560m→56000cm (1km=1x1000m=1x1000x100cm)	66. Convert 7888m to kilometers.	67. Convert 11.7km to meters.
68. Convert 44cm to millimeters.	69. Convert 3720cm to meters.	70. Convert 22cm to kilometers.

Determine the scale factor. Round your answer to four decimals.

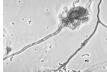|		
71. A whale shark measures 30m long. Determine the scale factor if it measures 8cm in the photograph. Possible Solution: Actual 30m→3000cm Photograph→8cm =0.0027	72. The tallest coast Douglas fir measures 94m. Wonita drew a picture of it that measures 11cm tall. Determine the scale factor.	73. The distance between Victoria and Comox on a map is 23.2cm. The actual distance is between the two cities is 180 kilometers. Determine the scale factor to 8 decimals.
74. The tallest redwood tree in world measures 5.4 cm in a photograph. Its actual height is 115m tall. Determine the scale factor.	75. A drawing of an Asian Long Horned Beetle is 2.4 cm long. The actual length is 32 mm. Determine the scale factor.	76. The greatest gap between rims in the Grand Canyon on a map is 2.9 cm. Determine the actual gap in km, if the scale factor is 1/1000000.
77. This is a dust mite and it eats your dead skin. It is 27mm in this picture. Its actual length is 0.045mm. Determine the scale factor to 1 decimal. Possible Solution: Actual→ 0.0045mm Picture→ 27mm	78. This is a picture of a type of mold that can cause hazards for many people. It measures 1.7 cm in this picture but actually measures. 0.0003cm. Determine the scale factor to 1 decimal.	79. The smallest gap between rims in the Grand Canyon 549m. Determine the length of this gap on a map in cm if the scale factor is 1/90000. Round your answer to 2 decimals.

13

Scale drawing problems.

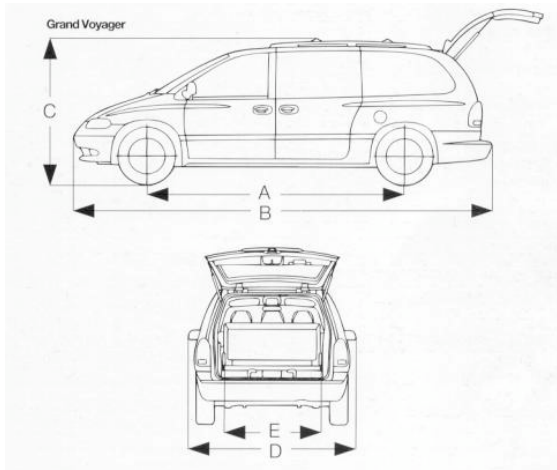All measurements are in millimeters.

2008 Audi A4

redlineblog.com
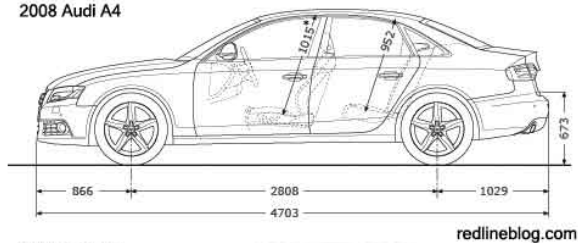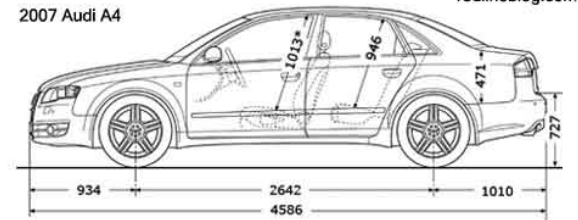
2007 Audi A4

80. Jason decides to make a replica of a 2007 Audi A4 and a 2008 Audi A4. Each vehicle will have a scale factor of 1/70. How much longer will the 2008 A4 be than the 2007 A4? Round your answer to one tenth of a mm.
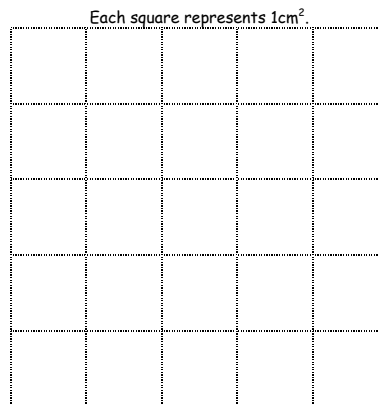
Challenge #3:

81. Sarender plans to make a replica of a Grand Voyager. She wants it to be one meter long. Determine the height and width in millimeters to one decimal.
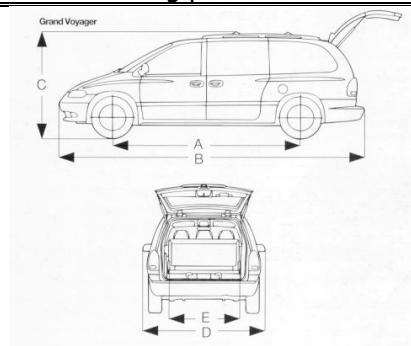

Grand Voyager

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

82. The dimensions for an indoor volleyball court are 18m by 9m. Draw a scale drawing with a scale factor of 1/500.

Each square represents 1cm².

83. The attack line is 3m from the net.   Back row players must jump behind this line to spike the ball. How far is this line from the net in the scale drawing?

14

Scale drawing problems.

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

84. Sarender plans to make a replica of a Grand Voyager. She wants it to be one meter long. Determine the height and width in millimeters to one decimal place.

Possible solution:
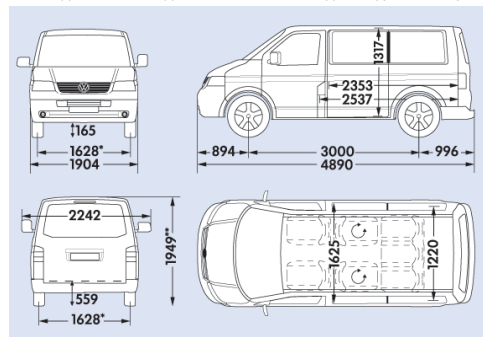
1. Actual→5070mm, Replica→1m→100cm→1000mm

2.

3. Actual →Replica
Height:
Width:

Building a model car. (Round your answer to the nearest hundredth of a cm.)

All measurements are in millimeters.

85. Sara just got a job at Volkswagen and is in charge of creating replica models of the vehicles for the show room. The replica needs to be 20cm long. Determine the scale factor.

86. If the replica must be 20cm long, how tall will it be if the replica is perfectly proportional?

87. John is creating a small-motorized version for the owner's child. The vehicle will be 100 cm wide from the outer edge of each mirror. Determine the scale factor.

88. If the width is 100cm from mirror to mirror, how tall will the vehicle be?

89. If the width is 100cm from mirror to mirror, how far apart will the center of the wheels be?

June 5th 2015

Draw a scale drawing.

90. The dimensions for an indoor volleyball court are 18m by 9m. Draw a scale drawing with a scale factor of 1/500.

① $18m = 1800cm$

② $1800\left(\frac{1}{500}\right)$
$= 3.6\,cm$

③ $900\left(\frac{1}{500}\right)$ Each square represents 1cm².
$1cm$

←1.8cm→
Net
0.6cm
3.6cm
1.8
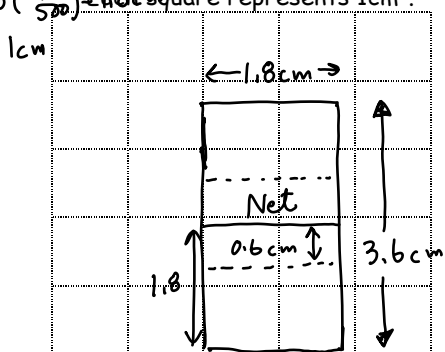
91. Back row players are not allowed to contact the ball above the net unless they jump from behind the attack line, which is 3m from the net. How far is this line from the net in the scale drawing?

① $3m = 300cm$

② Convert $300 \times \frac{1}{500} = 0.6cm$

③ The 3 meter line is 0.6cm Back from the net in the scale drawing.

92. The dimensions for an outdoor beach volleyball court are 16m by 8m. Draw a scale drawing with a scale factor of 1/500.

Each square represents 1cm².
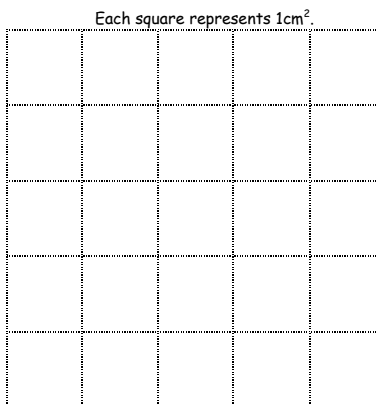
93. Compare the scale drawing dimensions of the indoor court to the beach court. How much wider is the indoor court?

94. The dimensions of 4' by 8' pool table are 112 cm by 224 cm. Draw a scale drawing with a scale factor of 1/45.

Each square represents 1cm².
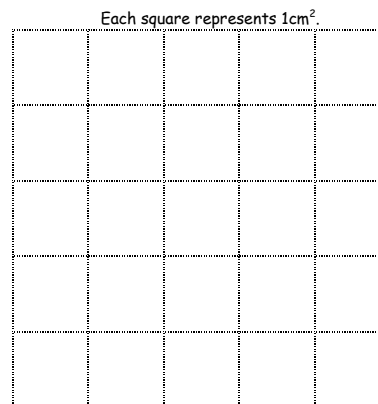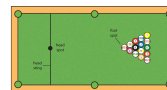
95. What is the distance between each pocket on the scale drawing?

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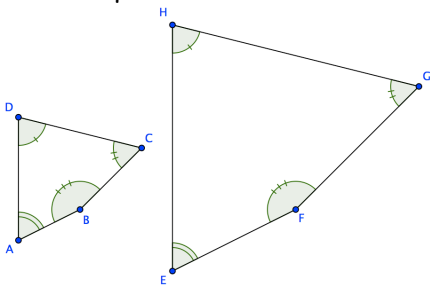
Similarity

Definition:

Similar Polygon
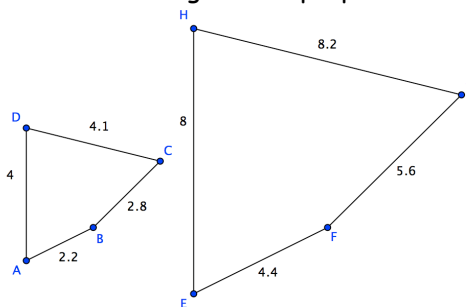- Polygons are similar if they are either reductions or enlargements of one another.

Polygons are similar if all corresponding angles are equal.

∠A=∠E, ∠B=∠F, ∠C=∠G, ∠D=∠H

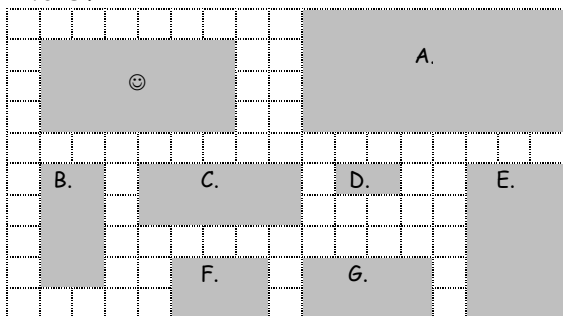Polygons are similar if corresponding pairs of side lengths are proportional.

$$\frac{AB}{EF} = \frac{2.2}{4.4} = \frac{1}{2}$$

$$\frac{BC}{FG} = \frac{2.8}{5.6} = \frac{1}{2}$$

$$\frac{CD}{GH} = \frac{4.1}{8.2} = \frac{1}{2}$$

$$\frac{AD}{EH} = \frac{4}{8} = \frac{1}{2}$$

Challenge #4:

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

97. Calculate the side length, in cm, in each proportion.

$$\frac{AB}{8cm} = \frac{30cm}{6cm}$$

Fill in the missing angles and side lengths.

98. Determine the missing angle.

A. ∠A=∠_____

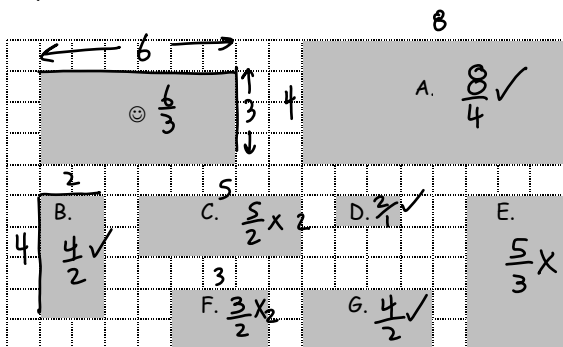B. ∠B=∠_____

C. ∠C=∠_____

D. ∠D=∠_____
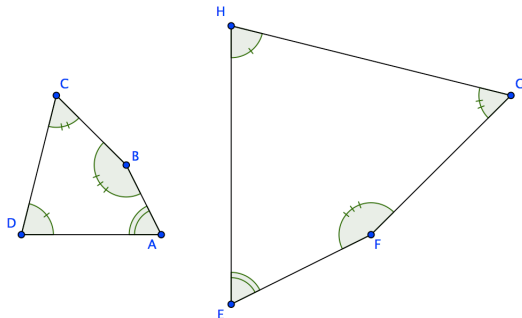
99. Complete the proportion.

A. $\dfrac{?}{AB} = \dfrac{?}{AD}$

B. $\dfrac{?}{BC} = \dfrac{?}{DC}$

Identify similar polygons

100. Which of the fallowing are similar to the quadrilateral marked ☺.

8

☺ $\frac{6}{3}$ 3 4.   A. $\frac{8}{4}$ ✓

B. $\frac{4}{2}$ ✓   C. $\frac{5}{2}$X 2   D. $\frac{3}{1}$ ✓   E. $\frac{5}{3}$X

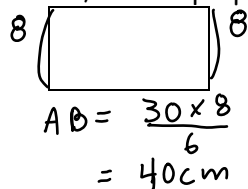F. $\frac{3}{2}$X   G. $\frac{4}{2}$ ✓

A, B, D, G are similar because corresponding pairs of sides are proportionate.

101. Which of the fallowing are similar to the quadrilateral marked ☺.

☺   A.   B.

C

D.   E.   F.   G.
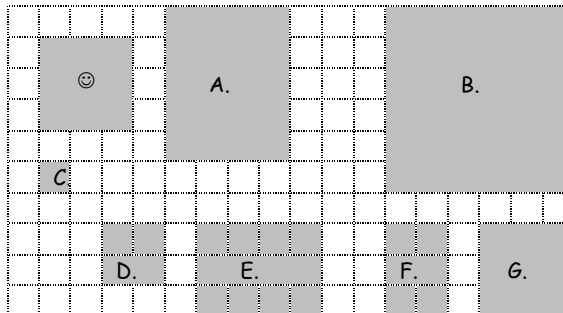
Determine the missing value. Round your answer to 1 decimal where appropriate.

102. Calculate the side length, in cm, in each proportion.

8 8

AB = $\frac{30 \times 8}{6}$

= 40cm

103. Solve for x in proportion.

104. Determine the value for y that makes each equation a proportion.
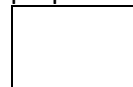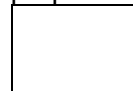
105. Solve for x in proportion.

106. Calculate the side length, in cm, in each proportion.

107. Determine the value for y that makes each equation a proportion.

Challenge #5:

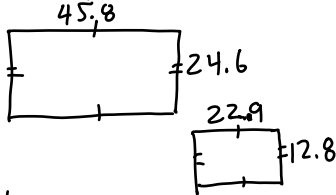**108.** Draw two rectangles with following dimensions:
- 45.8m by 24.6m
- 22.9m by 12.8m

Are the two rectangles similar? Explain how you know.

Sketch each pair of polygons and determine if they are similar or not? Explain how you know.

109. Draw two rectangles with following dimensions:	110. Draw two rectangles with following dimensions:	111. Draw two right triangles with following dimensions:
• 45.8m by 24.6m • 22.9m by 12.8m	• 15.55m by 13.24m • 62.2m by 52.96m	• 25.56m by 17.86m • 6.39m by 4.565m

109.

45.8

24.6

22.9

12.8

Check

$$\frac{45.8}{24.6} = 1.86179$$

$$\frac{22.9}{12.8} = 1.78906$$

Since the ratios of corresponding pairs of sides are not equal, the two rectangles are not similar.

112. Draw two right triangles with following dimensions:	113. Draw two equilateral triangles. Do they have to be similar? Explain.	114. Draw two isosceles triangles. Do they have to be similar? Explain.
• 20.91m by 17.72m • 8.39m by 5.56m		

19

Identify similar polygons.

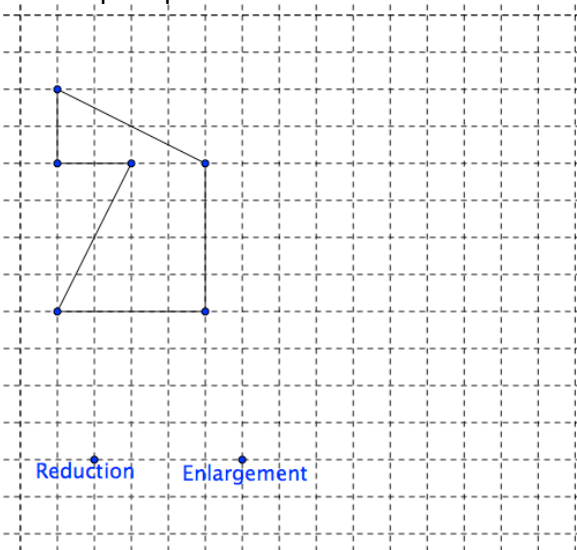115. Identify the polygons that are similar to the polygon marked A. Explain how you know.
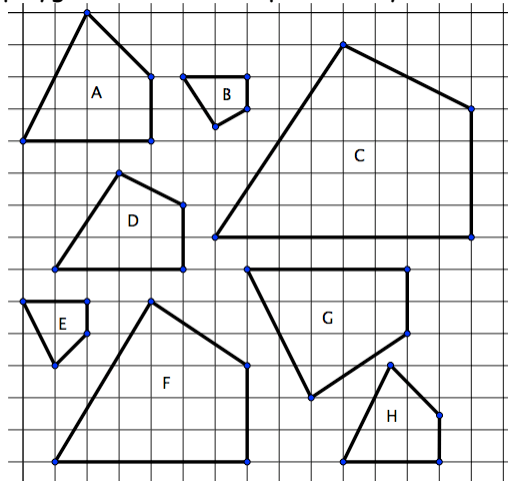
116. Identify the triangles that are similar to the triangle marked A. Explain how you know.
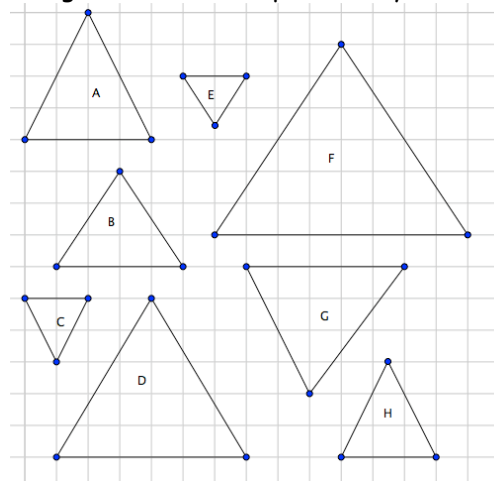
Challenge #6:

117. For the given polygon, draw a reduced similar polygon and an enlarged similar polygon in the space provided.
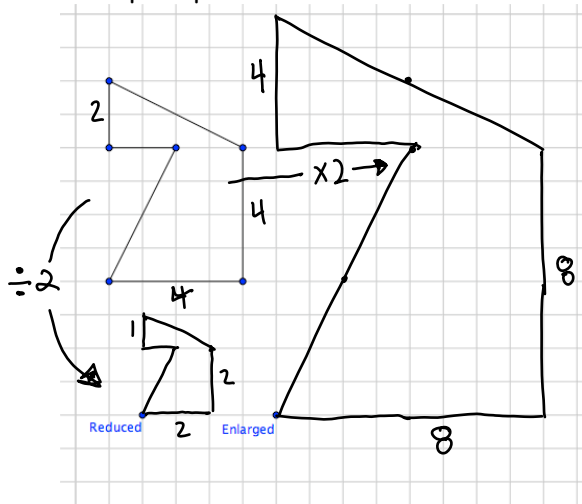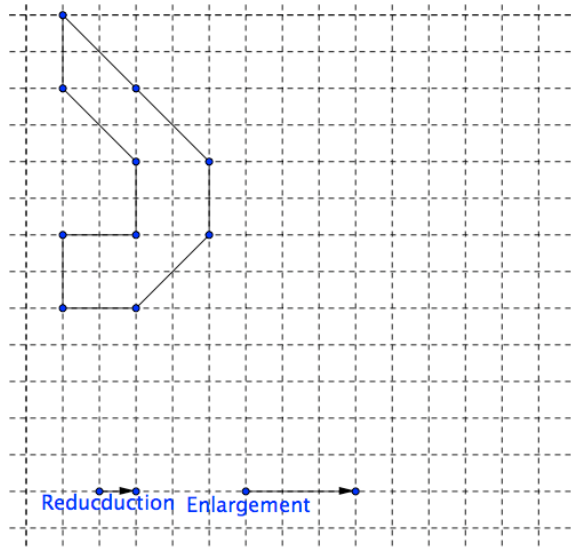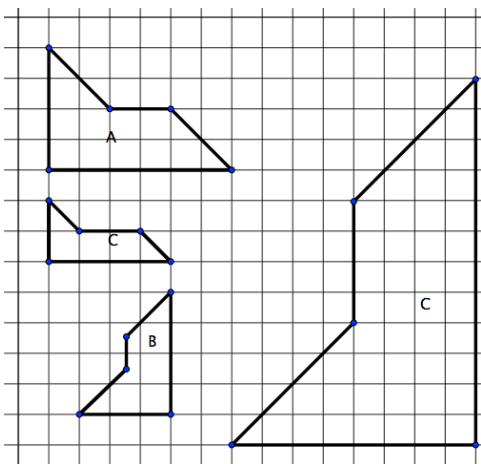
Reduction   Enlargement

118. Two quadrilaterals have two sides measuring 2cm and two sides measuring 5cm. Does this ensure that they are similar? Explain?

Reductions and enlargements

119. For the given polygon, draw a reduced similar polygon and an enlarged similar polygon in the space provided.
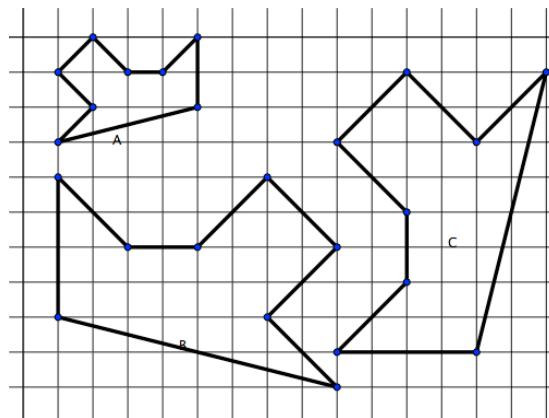

120. For the given polygon, draw a reduced similar polygon and an enlarged similar polygon using the first line drawn as a hint.

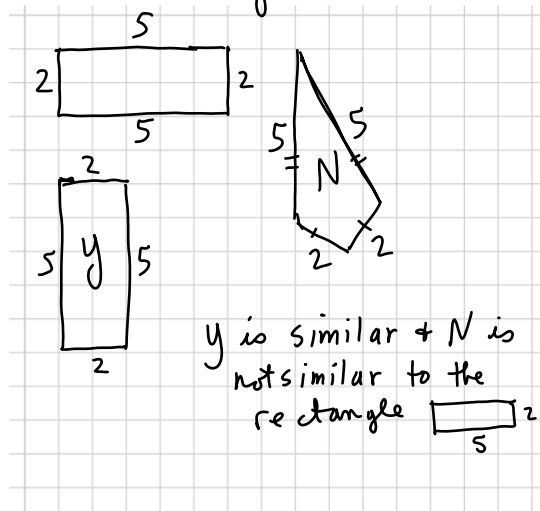121. Which of the following polygons are similar? Explain how you know.

122. Which of the following polygons are similar? Explain how you know.

Think about it!

123. Two quadrilaterals have two sides measuring 2cm and two sides measuring 5cm. Does this ensure that they are similar? Explain.

Not always.

y is similar & N is not similar to the rectangle [ ] *2.*

124. Draw a polygon by reducing each side length by half. Is it possible for the polygon not to be similar? Explain.
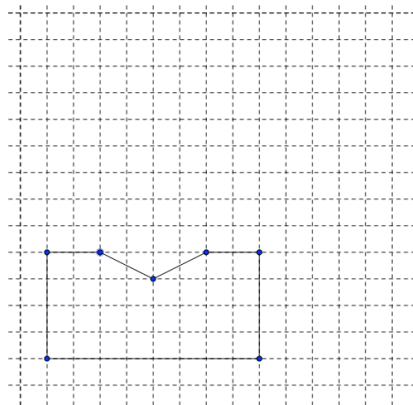
Round your answer to three decimals.

125. An Imax screen is 8 stories tall which makes it 21.5 m wide and 15.6 meters tall. Jimmy just bought a 46-inch TV, which is 1.17m wide. How tall will he want to make the vertical height on his TV to match Imax proportions?

126. Jimmy made a small miscalculation and realized that when the movie did not fit on the screen. He forgot that TVs are measured by their diagonal length not their horizontal. So 1.17m is actually the diagonal length not the horizontal length. Determine the actual width and height that he should set his TV to watch Imax movies.
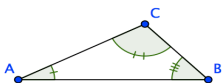
Similar Triangles

Definition:

Similar Triangles
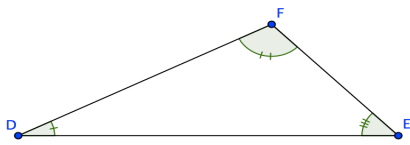- Triangles are similar if they are either reductions or enlargements of one another.

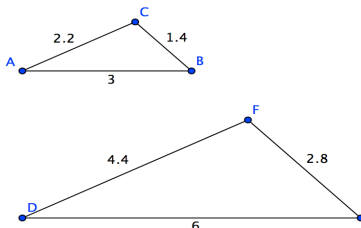|	
• Triangles are similar if all corresponding angles are equal.	OR: Triangles are similar if corresponding pairs of side lengths are proportional.

$\angle A = \angle D$

$\angle C = \angle F$

$\angle B = \angle E$

$$\frac{AC}{DF} = \frac{2.2}{4.4} = \frac{1}{2}$$

$$\frac{BC}{EF} = \frac{1.4}{2.8} = \frac{1}{2}$$

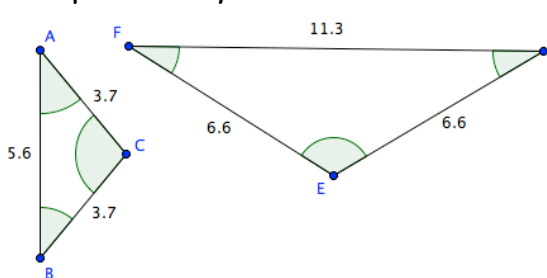$$\frac{AB}{DE} = \frac{3}{6} = \frac{1}{2}$$

Challenge #7:

127. Are these two triangles similar? Explain how you know.
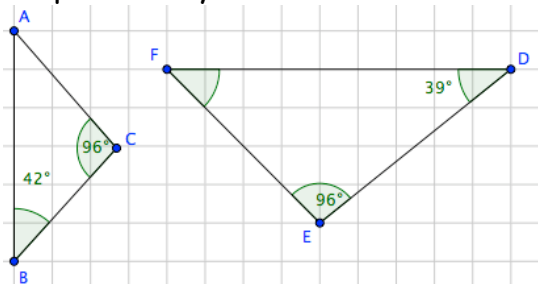
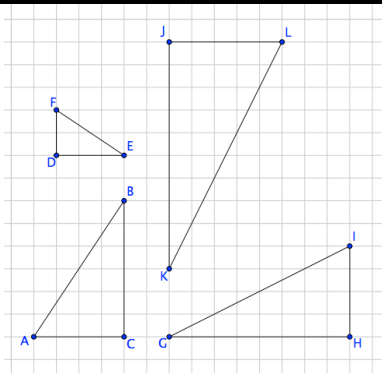128. Are these two triangles similar? Explain how you know.

Use the triangles to the right to complete the following proportions.

129. If $\dfrac{JL}{JK} = \dfrac{x}{GH}$, then x=_____.

130. If [ ] , then x=_____.

131. If [ ] , then x=_____.

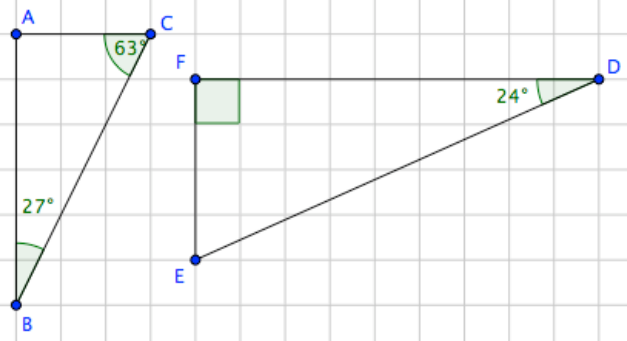132. If [ ] , then x=_____.

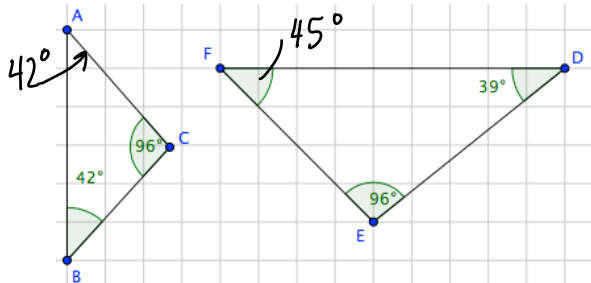## Which triangles in each pair are similar? Explain how you know.
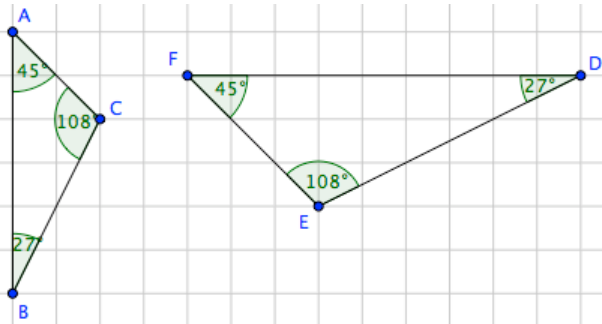
133.
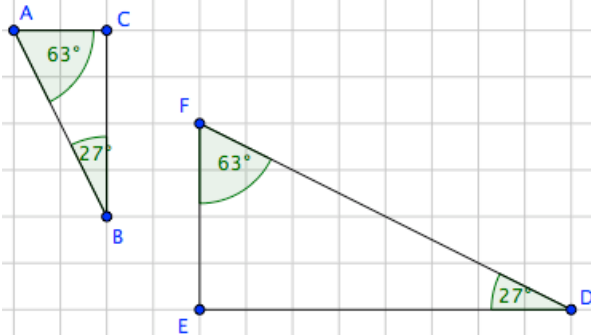
134.

135.

Possible solution strategy:
*Calculate all the internal angles.
*Since the corresponding angles are NOT all equal, the triangles are not similar.

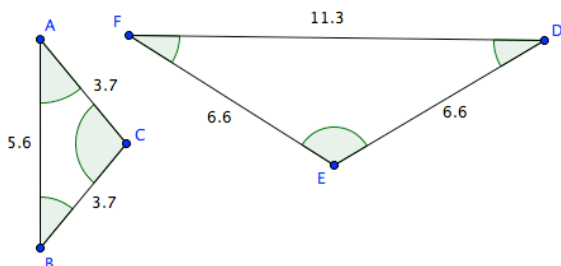**136.**

137. If two triangles are similar, what must be true about the angles? Be specific.

Determine which pair of triangles is similar. Explain how you know.

138.

Possible solution strategy:
*Compare ratios of corresponding sides:
*3.7/6.6=3.7/6.6=0.561 but does not equal 5.6/11.3=0.496
*Since one of the ratios is not same, the triangle is not similar.

139.

Determine which pair of triangles is similar. Explain how you know.

140.

141.

142. If two triangles are similar, what must be true about the sides? Be specific

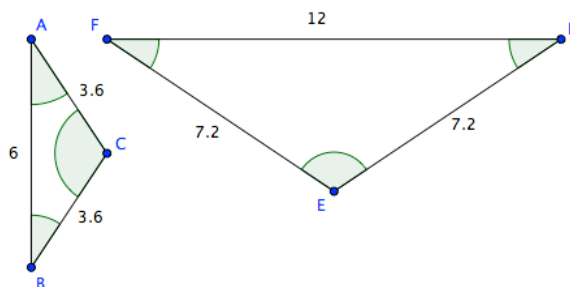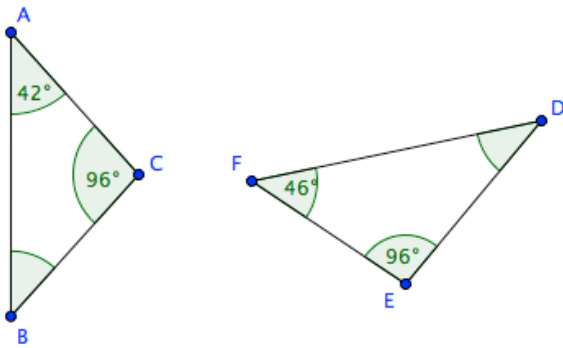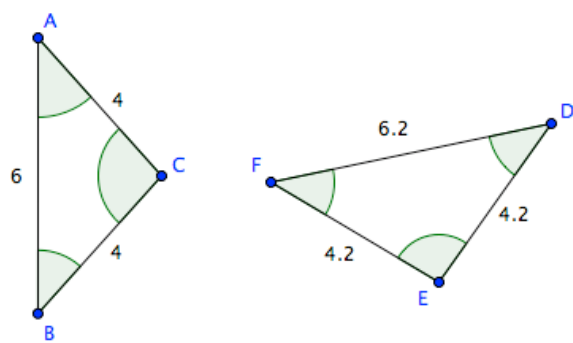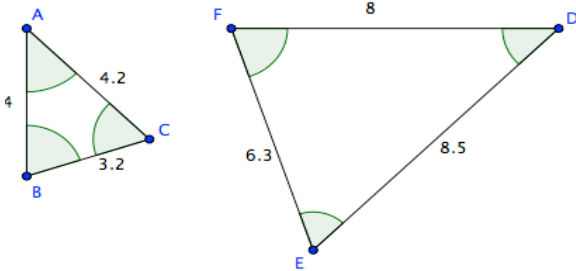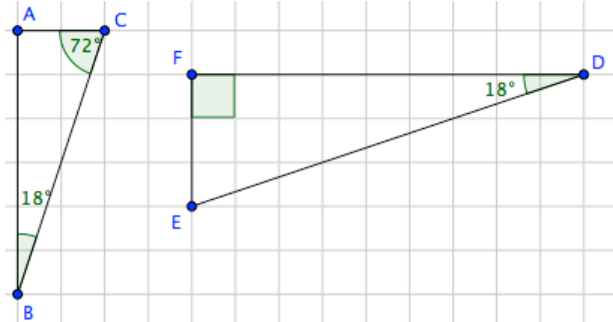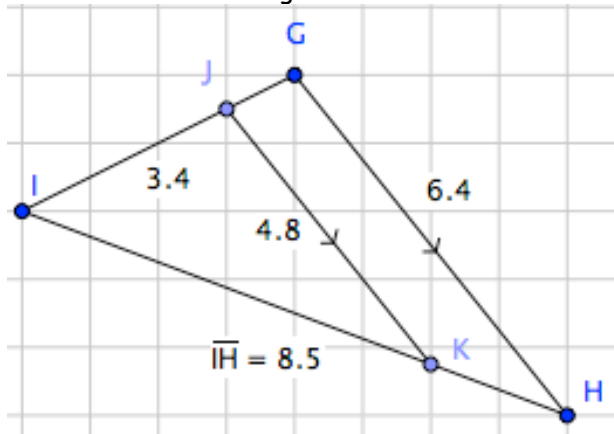## Determine which pair of triangles is similar. Explain how you know.

143.

144.

25
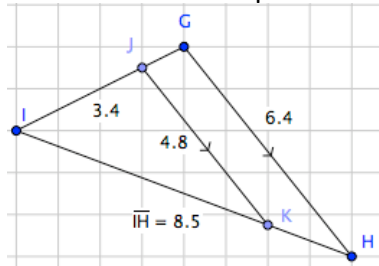
Challenge #8: Round your answer to 1 decimal place.

145. Determine the length of IK.

3.4
4.8
6.4
$\overline{IH} = 8.5$

146. 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 30feet wide. Determine how tall her roof is.

Determine the missing side lengths in each pair of similar triangles to 1 decimal.

147. Determine the length of IK. Record the process.

3.4   6.4
4.8
$\overline{IH} = 8.5$

① $\dfrac{IK}{JK} = \dfrac{IH}{GH}$

② $\dfrac{IK}{4.8} = \dfrac{8.5}{6.4}$

③ $IK = \dfrac{8.5 \times 4.8}{6.4}$

= 6.375 ✓

=6.4

148. Determine the length of AC. Record the process.

10
5
10.8
4
2
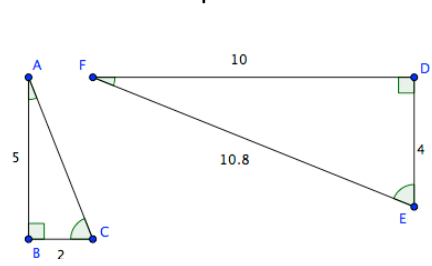
149. Determine the length of IG. Record the process.

6
4.5
6
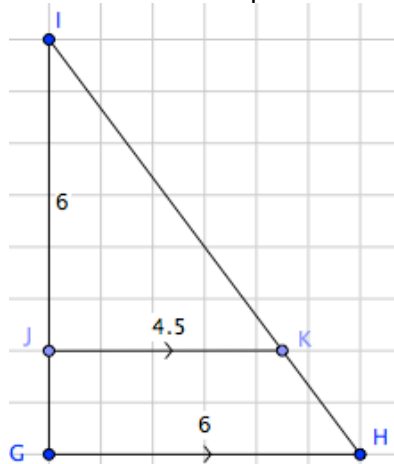
Determine the missing side lengths in each pair of similar triangles.

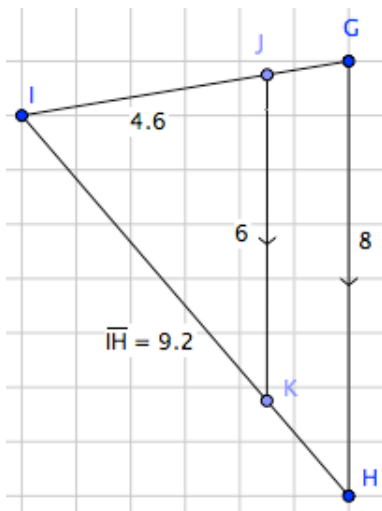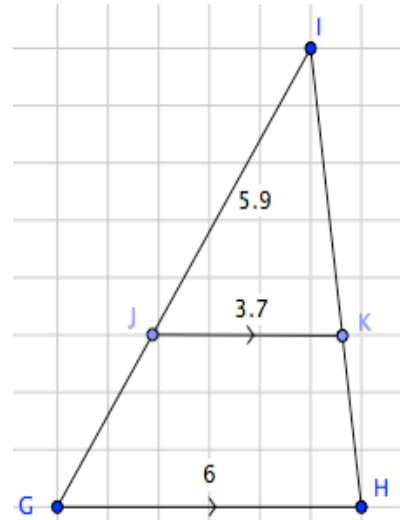|		
150. Determine the length of HK.	151. Determine the length of LP.	152. Determine the length of JG.

150. $\overline{IH} = 9.2$, 4.6, 6, 8

151. N, O, 4, 2.9, 2.3, P, L, M, 6

152. I, 5.9, J, 3.7, K, G, 6, H
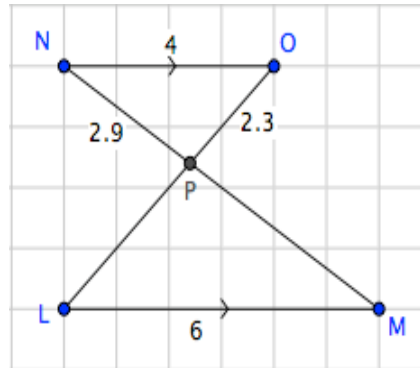
Using similar triangles to solve problems. Round your answer to the nearest tenth.

153. 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 30feet wide. Determine how tall her roof is.	154. Bella wants to estimate the height of her office building on a sunny day. She will use her shadow and the shadow of her office building to estimate the building's height. Bella is 1.4m tall and her shadow is 2m long. Determine the height of the building if the buildings shadow is 24m long.
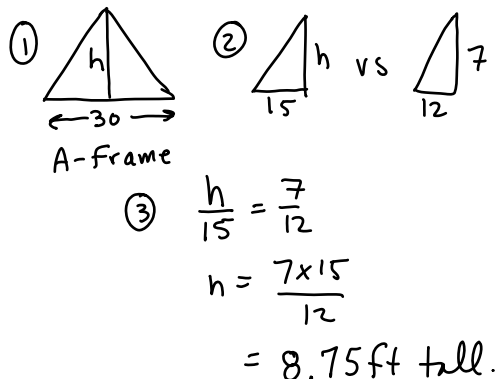
① h, ←30→, A-frame

② h vs 7, 15, 12

③ $\frac{h}{15} = \frac{7}{12}$

$h = \frac{7 \times 15}{12}$

$= 8.75 ft \; tall.$

27

Using similar triangles to solve problems.

155. Crazeen saw a water ski ramp at Lake Flyfar and determined the height of the ramp to be 1.66m and the ramp surface edge to be 6.4m. He wants to build a ramp on his home lake but wants to build a bigger one. He wants to keep the same proportions but knows the ramp surface edge can be no longer than 6.8m. Determine the height of his ramp to two decimals.

156. Jason found a photograph of a farmhouse with a roof that he really liked. The scale drawing said that the actual height of the roof was 4.5m tall and 6 meters to the center of the roof. He wants to have the same shape of roof for his new home. He has framed the lower part of the house and knows the distance to the center of the roof is 8m. Determine the height his roof.

Solve scale drawing problems. Round your answer to the nearest tenth.

157. Lumbarjay is going to cut down a large cedar tree on his property. He wants to make sure that it will not land on his house that is 24 meters from the base of the tree. He uses the sun's rays, his shadow and the shadow of the tree to help him make his decision. Lumbarjay is 1.8m tall and his shadow is 5m long. The shadow cast from the top of the tree is 32m long. Is his house in any danger? Explain how you know!
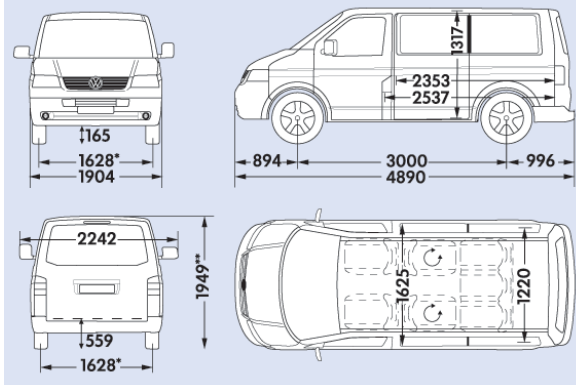
158. George is the kind of guy that would build a replica of a Chrysler Grand Voyager. If the total height of his model is 120mm how long will it be?

Find real life scale drawings.

159. Search the newspaper, magazine or the internet for an example of a scale drawing that is an enlargement. Cut out the picture and:

- Determine the scale factor.
- Measure the object on the paper and included those measurements.
- Include the real life measurements

I. Real Life Enlargement:	II. Real life Reduction:
A. Object:	A. Object:
B. Source:	B. Source:
C. Paper measurements:	C. Paper measurements:
D. Actual measurements:	D. Actual measurements:
E. Scale factor:	E. Scale factor:
F. Was the scale factor ideal? Explain.	F. Was the scale factor ideal? Explain.