Solve for x :

1) $\dfrac{3}{x-4} = \dfrac{7}{x}$

2) $\dfrac{1+3x}{4} = \dfrac{5}{2}$

3) $\dfrac{2x+5}{3} = \dfrac{x-5}{4}$

4) Mr. Jones has taken a survey of college students and found that 1 out of 5 students are liberal arts majors. If a college has 12,000 students, what is the best estimate of the number of students who are liberal arts majors?

5) A national forest service wanted to estimate the number of deer in a particular national park. They caught and tagged 72 deer and released them back into the park. Later they selected a sample of 323 deer. Of the 323 deer, 19 were tagged. Assuming that the proportion of tagged deer in the sample holds for all deer in the forest, what is the best estimate of the number of deer in the park?

6) In the diagram, AB : BC is in the ratio 2:7 and AC = 36. Find AB and BC.
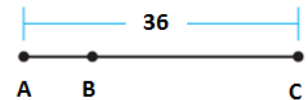
7) The measures of the angles of a triangle are in the extended ratio of 7 : 9 : 20. Find the measures of the angles of the triangle.

8) The perimeter of a rectangular corn field is 440 meters. The ratio of its length to its width is 7 : 4. What is the length and width of the field?

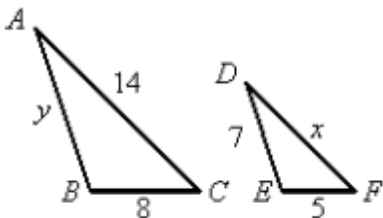9) Given that $\dfrac{ED}{BA} = \dfrac{EC}{BC}$, find *BC* to the nearest tenth. The figure is not drawn to scale.
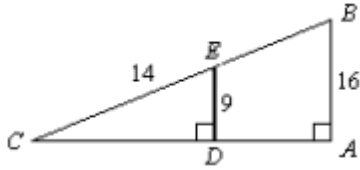
10) A map has a scale of 1 inch: 56 miles. If the actual distance between two cities is 448 miles, how far apart are they on the map?

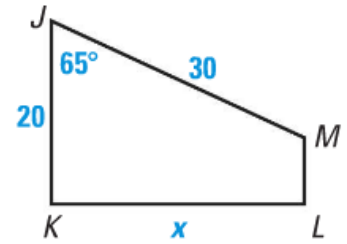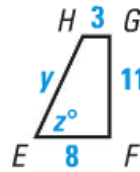11) Determine whether the polygons are similar. If they are, write a similarity statement and state the scale factor.
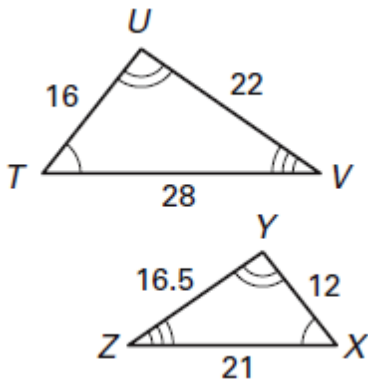
12) Given that $\triangle ABC : \triangle DEF$, please solve for x and y.

13) In the diagram, $JKLM \sim EFGH$.

a) Find the scale factor of JKLM to EFGH.
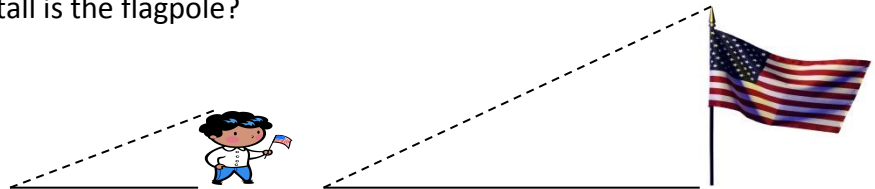
b) Find the values of x, y, and z.

c) Find the perimeter of each polygon.

d) Find the ratio of the perimeter of JKLM to EFGH.

14) A flagpole casts a shadow 48 feet long at the same time that a 6-ft tall person casts a shadow 24-ft long.   How tall is the flagpole?

15) Big Bird wants to find the height of the tree that contains his nest. From the base of the tree, Big Bird (who is 8 feet tall by the way) walks 58.5 feet along the tree's shadow until he is 3 feet from the end of the shadow. How tall is the tree? Label the diagram using the information above to help you solve the problem!
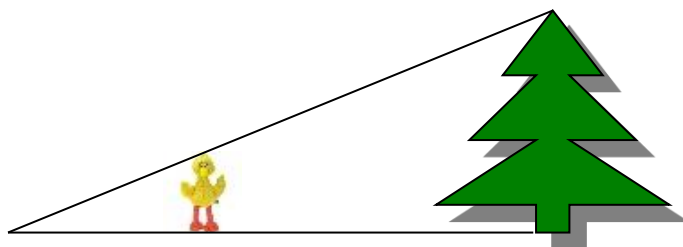
16) Liza is standing beside a basketball hoop. Liza is 6 feet 4 inches tall and casts a shadow that is 48 inches long. The basketball hoop casts a shadow that is 6 feet long. How tall is the basketball hoop (in feet)?

6 ft 4 in.

48 inches

6 feet
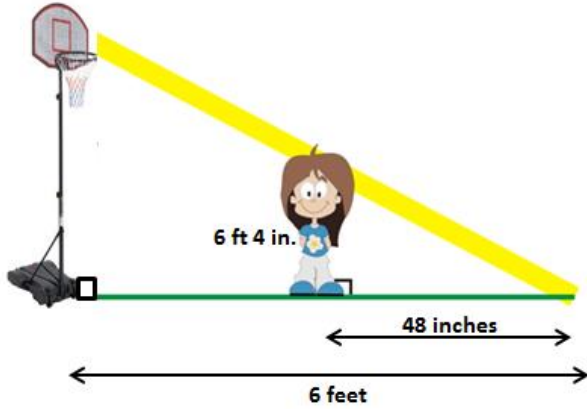
17) A 40 ft tree is inverted (looks upside down) when viewed through a lens. Its image through the lens is also smaller.

   a. If $\overline{AB} \| \overline{DE}$, please explain why the triangles shown are similar.

A

12.5 ft

C

B

D

40 ft

100 ft

E
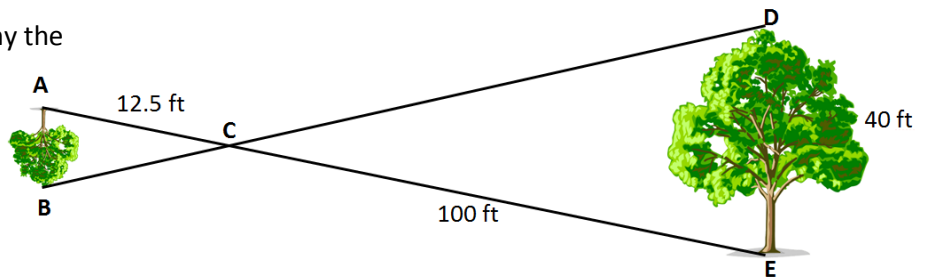
   b. Write a similarity statement.

   c. Write a proportion to find the height of the inverted image (which is AB).

Answer Key

1) 7
2) 3
3) -7
4) 2400 students
5) 1224 deer
6) AB = 8 , BC = 28
7) 35°, 45°, 100°
8) Length: 140m, width: 80m
9) 24.9
10) 8 inches
11) Yes,   △$TUV \sim$ △XYZ by AA~; scale factor is 4:3 OR △$XYZ \sim$ △TUV by AA~; scale factor is 3:4
12) x = 8.75, y = 11.2
13) a. $\frac{5}{2}$ or 5:2   b. x = 27.5, y = 12, z = 65   c. JKLM = 85 , EFGH = 34   d. $\frac{5}{2}$ or 5:2
14) 12 ft
15) 164 ft
16) 9.5 ft or 9 ft 6 in
17) a. $\angle A \cong \angle E$ **OR** $\angle B \cong \angle D$ by alternate interior angles theorem, and $\angle ACB \cong \angle ECD$ by vertical angles theorem; so the triangles are similar by AA~

    b. △$ABC \sim$ △EDC

    c. $\dfrac{x}{40} = \dfrac{12.5}{100}$; 5 ft