

# Adv. Geometry 6.1 Ratios, Proportions +

Key

Simplify the ratio.

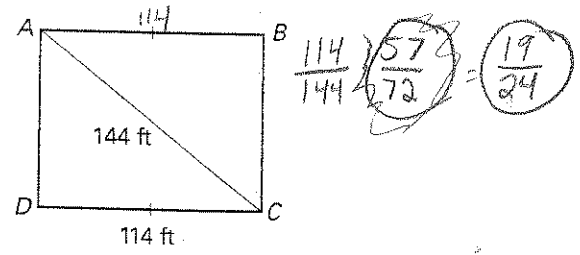
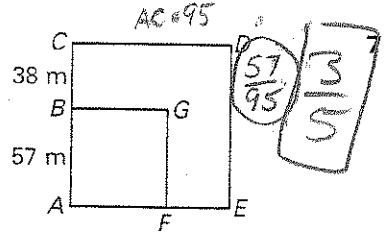
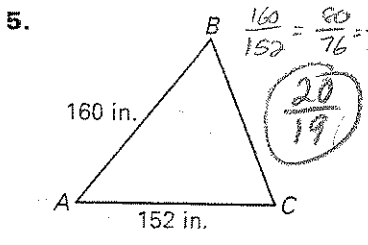
1.  $1 \text{ oz} : 2 \text{ qt}$   
 $\frac{1}{64}$

2.  $\frac{2 \text{ cups}}{1 \text{ gallon}}$   
 $\frac{2}{16} = \frac{1}{8}$

3. 4 seconds : 1 year  
 $\frac{4}{3153600} = \frac{1}{788400}$

4. 7 qt : 550 gallons  
 $\frac{7}{2200}$

Find the ratio of AB to AC in simplest form.



Let  $x = 8$ ,  $y = 6$ , and  $z = 5$ . Write the ratio in simplest form.

8.  $3z : 2y$   
 $5 : 4$

9.  $2z : y + x$   
 $5 : 7$

10.  $\frac{3z + 2y}{4z}$   
 $\frac{27}{20}$

11.  $\frac{(x+y)-z}{2y}$   
 $\frac{9}{12} = \frac{3}{4}$

The perimeter and the ratio of the length to the width of a rectangle are given. Find the length and width of the rectangle.

12. Perimeter: 132 cm  
 $l : w = 7 : 4$   
 $2l + 2w = 132$   
 $7x + 4x = 132$   
 $11x = 132$   
 $x = 12$   
 $l = 28, w = 24$

13. Perimeter: 280 ft  
 $l : w = 11 : 9$   
 $2l + 2w = 280$   
 $11x + 9x = 140$   
 $20x = 140$   
 $x = 7$   
 $l = 77, w = 63$

~~14. Perimeter: 420 yd~~  
 $l : w = 17 : 13$   
 $17x + 13x = 210$   
 $30x = 210$   
 $x = 7$   
 $l = 119, w = 91$

The measures of the angles of a triangle are in the extended ratio given. Find the measures of the angles of the triangle.

15.  $2 : 5 : 5$   
 $2x + 5x + 5x = 180$   
 $12x = 180$   
 $x = 15$   
 $30^\circ, 75^\circ, 75^\circ$

~~16.  $3 : 7 : 10$~~   
 $3x + 7x + 10x = 180$   
 $20x = 180$   
 $x = 9$   
 $27^\circ, 63^\circ, 90^\circ$

17.  $7 : 16 : 22$   
 $7x + 16x + 22x = 180$   
 $45x = 180$   
 $x = 4$   
 $28^\circ, 64^\circ, 88^\circ$

Solve the proportion.

18.  $\frac{7}{12} = \frac{x}{48}$   
 $x = 28$

19.  $\frac{11}{a} = \frac{55}{75}$   
 $a = 15$

~~20.  $\frac{14}{y-5} = \frac{2}{3}$~~   
 $y = 26$

21.  $\frac{2z}{27} = \frac{3z+9}{81}$   
 $z = 3$

~~22.  $\frac{48}{68} = \frac{b+2}{b+7}$~~   
 $b = 10$

23.  $\frac{9}{s} = \frac{s}{16}$   
 $s = 12$

~~24.  $\frac{19}{32} = \frac{7d+3}{15d-11}$~~   
 $d = 5$

~~25.  $\frac{x}{111} = \frac{5x-28}{333}$~~   
 $x = 14$

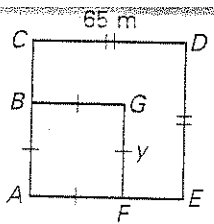
26.  $\frac{4x}{6x+4} = \frac{x}{25}$   
 $x = 16$

Use the given ratio and information in the figure to find the value of the variable(s).

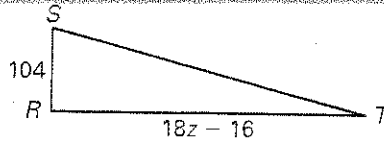
27.  $CD : AB = 5 : 3$

~~28.  $RS : RT = 13 : 25$~~

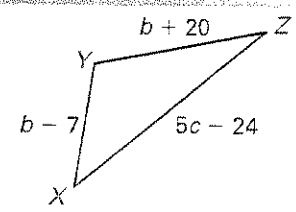
29.  $XY : YZ : XZ = 7 : 10 : 14$



$\frac{65}{y} = \frac{5}{3}$   
 $195 = 5y$   
 $39 = y$



$\frac{13}{25} = \frac{104}{18z-16}$   
 $234z = 208 = 2600$   
 $z = 12$



$\frac{b-7}{5c-24} = \frac{7}{14}$   
 $63 = 5c - 24$   
 $126 = 5c$   
 $c = 30$

$\frac{b-7}{b+20} = \frac{7}{10}$   
 $10b - 70 = 7b + 140$   
 $3b = 210$   
 $b = 70$

Find the geometric mean of the two numbers.

30. 6 and 24  $\sqrt{144} = 12$   
 31. 7 and 28  $\sqrt{196} = 14$   
 32. 4 and 12  $\sqrt{48} = 4\sqrt{3}$   
 33. 9 and 12  $\sqrt{108} = 6\sqrt{3}$   
 34. 15 and 45  $\sqrt{675} = 15\sqrt{3}$   
 35. 12 and 48  $\sqrt{576} = 24$

The area and the ratio of the length to the width of a rectangle are given. Find the length and width of the rectangle.

36. Area:  $192 \text{ ft}^2$   
 $l:w = 1:3$   
 $3x \cdot x = 192$   
 $3x^2 = 192$   
 $x^2 = 64$   
 $x = 8$   
 $l = 8$   
 $w = 24$
- Area:  $294 \text{ yd}^2$   
 $l:w = 3:2$   
 $3x \cdot 2x = 294$   
 $6x^2 = 294$   
 $x^2 = 49$   
 $x = 7$   
 $l = 21$   
 $w = 14$

The three coordinate points are collinear. Use slopes to write a proportion to find the value of a.

38.  $(-4, 1), (-1, 2), (5, a)$   
 $\frac{2-1}{-1-(-4)} = \frac{a-1}{5-(-4)}$   
 $\frac{1}{3} = \frac{a-1}{9}$   
 $3(a-1) = 9$   
 $3a - 3 = 9$   
 $3a = 12$   
 $a = 4$
39.  $(4, 5), (1, 2), (a, 0)$   
 $\frac{2-5}{1-4} = \frac{0-2}{a-4}$   
 $\frac{-3}{-3} = \frac{-2}{a-4}$   
 $1 = \frac{-2}{a-4}$   
 $a-4 = -2$   
 $a = 2$

~~40. Rectangles~~ The ratio of the length to the width of one rectangle is proportional to the ratio of the length to the width of a smaller rectangle. Describe the circumstances for which this proportion involves a geometric mean. *When the width of one rect = length of other rect.*

41. Carpet Cleaning A carpet cleaning solution calls for a mixture of 1 ounce of cleaner per 2 quarts of water. You use a total of 13 gallons of water in mixing the solution according to these directions. How much cleaning solution do you use?  
 52 qts of water  
 26 oz

42. Sports Training Over a given period of time, you can lose weight if your body burns more Calories than it consumes. Specifically, it takes a difference of 3500 Calories to lose 1 pound of body weight. Suppose your total body weight decreases by 42 ounces while you are training for a sport. How many more Calories has your body burned than it has consumed during this time?  
 1 lb = 16 ounces  
 $\frac{42}{16} = 2.625 \cdot 3500$   
 9187.5 cal.

Solve the proportion.  $(2a+8)(a+5)$   
 $2a^2 + 8a + 2a + 40$

1.  $\frac{3}{a+5} = \frac{2a+8}{8}$   
 $24 = 2a^2 + 18a + 40$   
 $0 = 2a^2 + 18a + 16$   
 $= 2(a^2 + 9a + 8)$   
 $0 = 2(a+1)(a+8)$   
 $a = -1 \quad a = -8$

~~2.  $\frac{w-3}{10} = \frac{2w}{6w+4}$~~   
 $6w^2 + 4w - 12 = 20w$   
 $6w^2 - 16w - 12 = 0$   
 $3w^2 - 4w - 6 = 0$   
 $2(3w^2 - 17w - 6) = 0$   
 $2(3w+1)(w-6) = 0$   
 $w = -\frac{1}{3} \quad w = 6$

Find the values of x and y.

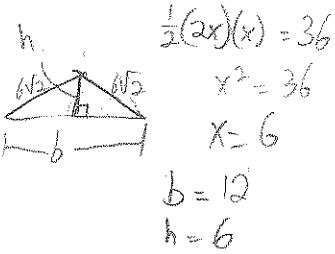
5.  $\frac{3}{x} = \frac{9}{2x+5} = \frac{6y}{20}$   
 $6x + 15 = 9y$   
 $15 = 3x$   
 $5 = x$   
 $\frac{9}{15} = \frac{6y}{20}$   
 $180 = 90y$   
 $2 = y$

6.  $\frac{y-2}{3} = \frac{1-5x}{y-4} = \frac{24}{y-1}$   
 $y^2 - 3y + 2 = 72$   
 $y^2 - 3y - 70 = 0$   
 $(y-10)(y+7) = 0$   
 $y = 10 \quad y = -7$

$\frac{1-5x}{6} = \frac{24}{9}$   
 $9 - 45x = 144$   
 $-45x = 135$   
 $x = -3$

$\frac{1-5x}{-11} = \frac{24}{-8}$   
 $\frac{1-5x}{-11} = -3$   
 $1-5x = 33$   
 $-5x = 32$   
 $x = \frac{32}{-5}$

9. The area of an isosceles triangle is 36 square inches. The ratio of the length of the triangle's base to its height is 2:1. What is the perimeter of the triangle?



$P = 12\sqrt{2} + 12$