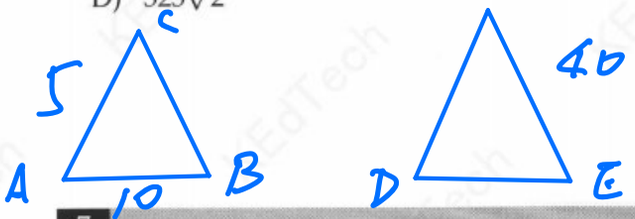
6

Right triangles ABC and DEF are similar, where A and D are right angles, and B corresponds to E. If $AB = 12$, $BC = 60\sqrt{2}$, and $DF = 105$, what is the length of side EF ?

A) $48\sqrt{2}$
B) $75\sqrt{2}$
C) $100\sqrt{2}$
D) $525\sqrt{2}$



7

Isosceles triangles ABC and DEF are similar, where A corresponds to D and B corresponds to E. The measure of angle A is equal to the measure of angle B, $AB = 10$, $AC = 5$, and $EF = 40$. What is the length of side DE ?

A) 20
B) 40
C) 60
D) 80

$AC : BC = 5$

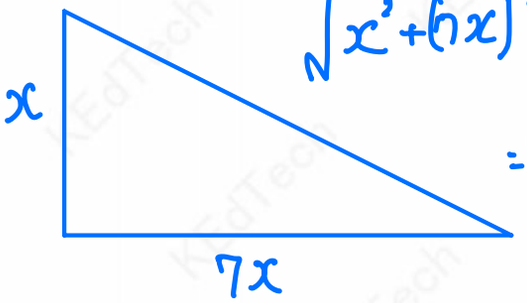
$\frac{BC}{EF} = \frac{5}{40} = \frac{1}{8}$

$\frac{AB}{DE} = \frac{10}{DE} = \frac{1}{8}$

8

$$A(x) = \frac{1}{2}x(7x)$$

The function A gives the area, in square feet, of a certain right triangle, where x is the length, in feet, of one of the legs of the triangle. If the length of this triangle's hypotenuse, in feet, can be written in the form $ax\sqrt{b}$, where a and b are integers, what is the value of $a + b$?



$\sqrt{x^2 + (7x)^2} = \sqrt{x^2 + 49x^2}$

$= \sqrt{50x^2}$

$= 5\sqrt{2} \cdot x$

$a = 5 \quad b = 2 \quad a + b = 7$

9

In triangle ABC, the measure of angle A is 30° and $AB = AC$. In triangle DEF, the measure of angle E is 75°. Which additional piece of information is sufficient to determine whether triangle ABC is similar to triangle DEF ?

A) The lengths of $\overline{AB}$ and $\overline{DE}$
B) The lengths of $\overline{BC}$ and $\overline{EF}$
C) The measure of angle B
D) The measure of angle F

10

According to the triangle inequality theorem, the length of any side of a triangle must be smaller than the sum of the lengths of the other two sides. If a triangle has side lengths of 9 inches, 15 inches, and x inches, which inequality represents all possible values of x ?

A) $0 < x < 24$
B) $6 < x < 24$
C) $12 < x < 24$
D) $x > 24$

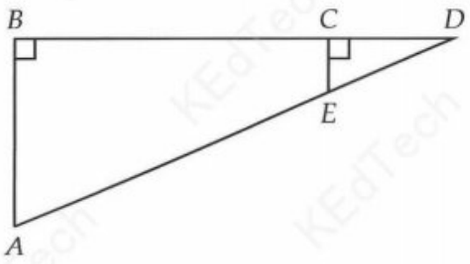
11

In triangles LMN and PQR, angles M and Q each have measure 54°, $MN = 16$, and $QR = 16$. Which additional piece of information is sufficient to prove that triangle LMN is congruent to triangle PQR ?

A) Angles L and R each have measure 44°.
B) Angles N and P each have measure 44°.
C) $LM = 11$ and $PQ = 11$
D) $LN = 11$ and $PR = 11$

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12



Note: Figure not drawn to scale.

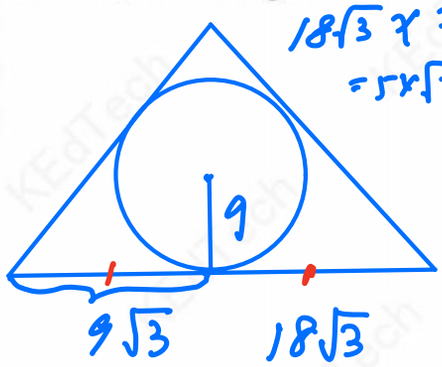
In the figure shown, $CE = 9$ and $BC = 6CD$. What is the length of line segment AB?

63

13

A circle is inscribed in an equilateral triangle. The radius of the circle is 9 inches. What is the perimeter, in inches, of the triangle?

A) $18\sqrt{3}$
B) $27\sqrt{3}$
C) $54\sqrt{3}$
D) 108



$18\sqrt{3} \times 3 = 54\sqrt{3}$

14

In triangle ABC, angle B measures 90°, $AC = 106$, and $BC = 90$. Point D on side AC is connected by a line segment with point E on side BC such that line segment DE is parallel to side AB, and $DE = 14$. What is the length of line segment BE?

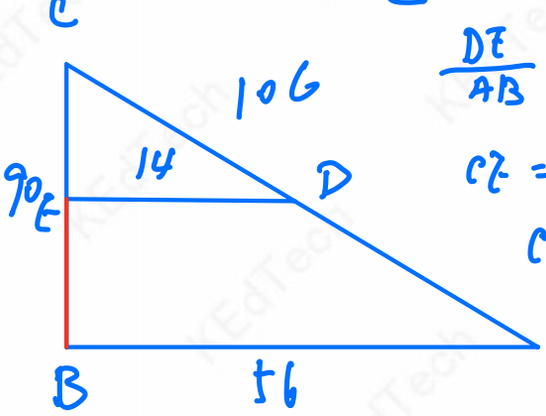
$\triangle CED \sim \triangle CBA$

$\frac{DE}{AB} = \frac{1}{4} = \frac{CE}{CB}$

$CE = \frac{1}{4} \cdot CB$

$CE = \frac{1}{4} \cdot 90$

$= 22.5$



$BE = 90 - 22.5 = 67.5$

15

In triangle FGH, $FG = 21$ and $GH = 27$. In triangle XYZ, $XY = 28$ and $YZ = 36$. Which additional piece of information is sufficient to prove that triangles FGH and XYZ are similar?

I. The measure of angle G is equal to the measure of angle Y.
II. $FH = 15$ and $XZ = 20$

A) I is sufficient, but II is not.
B) II is sufficient, but I is not.
C) I is sufficient and II is sufficient.
D) Neither I nor II is sufficient.

16

An equilateral triangle is inscribed in a circle. The triangle has a side length of $22\sqrt{3}$ feet. What is the radius, in feet, of the circle?

A) $11\sqrt{3}$
B) 22
C) 33
D) 44

17

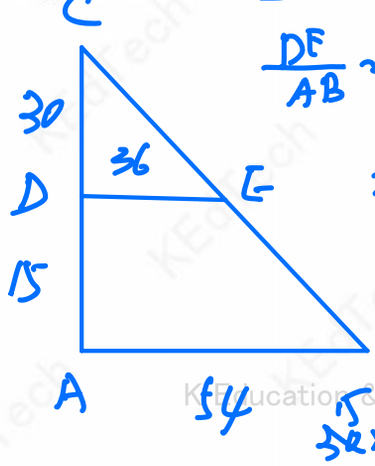
In triangle ABC, angle A is a right angle, point D lies on $\overline{AC}$, point E lies on $\overline{BC}$, and $\overline{DE}$ is parallel to $\overline{AB}$. The length of $\overline{DE}$ is 36 inches, the length of $\overline{AB}$ is 54 inches, and the length of $\overline{AD}$ is 15 inches. What is the area, in square inches, of triangle CDE?

$\triangle CDE \sim \triangle CAB$

$\frac{DE}{AB} = \frac{36}{54} = \frac{x}{x+15}$

$2x + 30 = 3x$

$30 = x$



$\frac{1}{2} \times 36 \times 30 = 540$

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18

In triangle ABC, angle B is a right angle, point D lies on $\overline{AB}$, point E lies on $\overline{AC}$, and $\overline{DE}$ is perpendicular to $\overline{AC}$. If the length of $\overline{AB}$ is 12 units, the length of $\overline{AC}$ is 13 units, and the length of $\overline{DE}$ is 3 units, what is the length of $\overline{AE}$, in units?

7.2

19

In triangle ABC, $AB = 6$, $BC = 6$, and the measure of angle ABC is 120°. What is the area of triangle ABC ?

A) $2\sqrt{3}$
B) $4\sqrt{3}$
C) $6\sqrt{3}$
D) $9\sqrt{3}$

20

Square $ABCD$ has a side length of 12. Point F lies on $\overline{BC}$, and $\overline{AF}$ and $\overline{BD}$ intersect at point E. The length of $\overline{BF}$ is 4. What is the length of $\overline{BE}$?

A) 3
B) $2\sqrt{2}$
C) $3\sqrt{2}$
D) $4\sqrt{2}$

$\triangle AED \sim \triangle BEF$

$\frac{BE}{DE} = \frac{4}{12}$

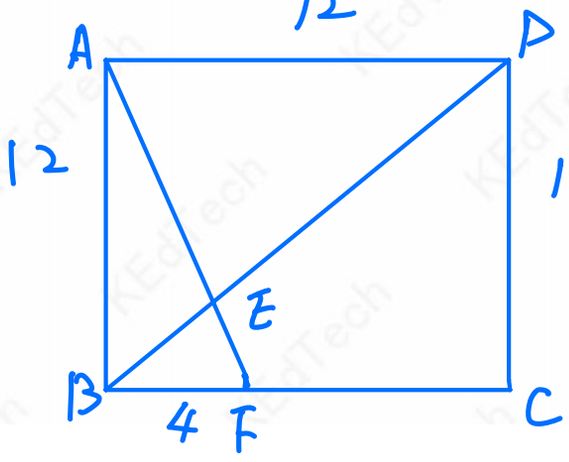
$\frac{BE}{DE} = \frac{1}{3}$

$BD = 12\sqrt{2}$

$BE = \frac{1}{4} \cdot BD$

$= \frac{1}{4} \cdot 12\sqrt{2}$

$= 3\sqrt{2}$



21

A right triangle has a perimeter of $78 + 78\sqrt{3}$ centimeters and an angle measuring 30°. What is the length, in centimeters, of the shortest side of this triangle?

A) 26
B) $26\sqrt{3}$
C) 39
D) $39\sqrt{3}$

22

In triangle QRS, angle Q is a right angle and $\overline{QT}$ is an altitude of the triangle. The length of $\overline{QS}$ is 15 units and the length of $\overline{RS}$ is 17 units. What is the length of $\overline{TS}$ to the nearest tenth of a unit?

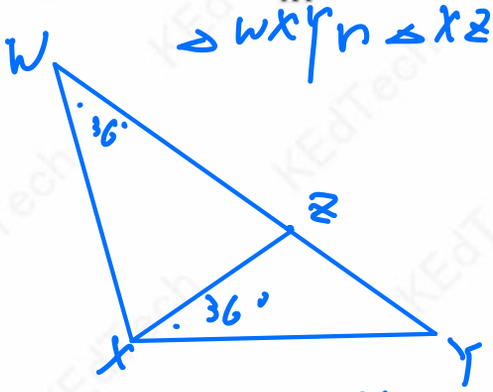
A) 12.6
B) 12.8
C) 13.2
D) 13.4

23

In triangle WXY, point Z lies on $\overline{WY}$, and the measures of $\angle W$ and $\angle YXZ$ are each 36°. Which of the following ratios is equal to $\frac{WY}{XY}$?

A) $\frac{WX}{XZ}$
B) $\frac{XY}{WX}$
C) $\frac{XY}{YZ}$
D) $\frac{YZ}{XZ}$

$\triangle WXY \sim \triangle XZY$



$\frac{WX}{XZ} = \frac{XY}{ZY} = \frac{WY}{XY}$

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EXERCISE 1: Answers for this exercise start on page 319.

1

$$48 = \frac{8}{-x}$$

What is the solution to the given equation?

$\frac{48}{1} = \frac{8}{-x}$ $-x \cdot 48 = 8$

$x = \frac{8}{-48} = -\frac{1}{6}$

2

If $18 + 9x = 54$, what is the value of $2 + x$?

6

3

$$9 = -24 + 3x$$

Which equation has the same solution as the given equation?

A) $-3x = -15$
B) $3x = -15$
C) $-3x = -33$
D) $3x = -33$

4

If $3x - 8 = -23$, what is the value of $6x - 7$?

A) -5
B) -21
C) -30
D) -37

5

$$3(5 - 2x)(3 + x) = 0$$

What positive value of x is a solution to the given equation?

6

$$-3(r - 9) + 5(r - 9) = -4$$

What value of r is the solution to the given equation?

7

If $x^2 + 3x + 16 = 0$, what is the value of $5x^2 + 15x$?

8

If $\frac{12 - x}{9} = \frac{12 - x}{4}$, the value of $12 - x$ is between which of the following pairs of values?

A) -14 and -9
B) -8 and -4
C) -3 and 4
D) 5 and 13

9

$$\frac{64x^2}{36} = 64$$

What is the negative solution to the given equation?

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