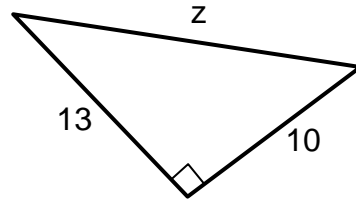# LESSON 3 PRACTICE PROBLEMS KEY

1) The side *z* is between which two integers?

c) 16 and 17
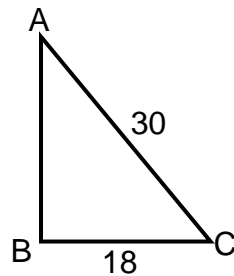
$$a^2 + b^2 = c^2$$
$$13^2 + 10^2 = z^2$$
$$169 + 100 = z^2$$
$$269 = z^2$$
$$z = \sqrt{269} \approx \mathbf{16.4}$$

2) What is the length of AB in the right triangle above?

b) 24

3 – 4 – 5		
x6 x6 x6		
18 – 24 – 30		

3) A rectangular box has a base that is a rectangle with width 5 in. and length 10 in. If the volume of the box is 975 cubic inches, what is the height of the box?
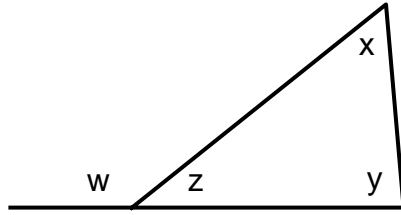
c) 19.5

$$V = L \bullet W \bullet H$$
$$975 = 10(5)H$$
$$975 = 50H$$
$$H = 19.5$$

An exterior angle of a triangle is equal to the sum of the two remote (far away) angles.

x + y = w

4) Given the triangle above, what is the value of x + y?

a) w

5) A company has 16 million dollars in total expenses for one year. A circle graph shows a sector of 270 degrees representing employee salaries. How much was spent on employee salaries?
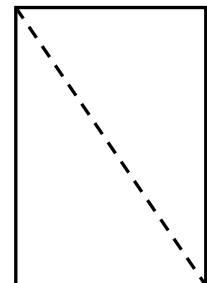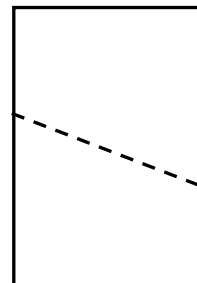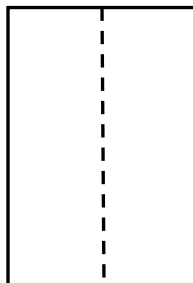
c) 12 million

$$\frac{\text{degrees}}{\$} = \frac{\text{degrees}}{\$}$$

$$\frac{270}{x} = \frac{360}{16}$$

$$360x = 4320$$

$$x = 12$$

6) Taylor rips a 9 in. by 12 in. magazine page neatly in half, forming two congruent pieces. What shape could these pieces be? Choose <u>all</u> that apply.
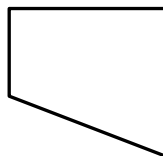
☒ **a) Rectangle**

☒ **d) Trapezoid**

☒ **e) Triangle**

A trapezoid is a 4-sided figure that has 1 pair of sides parallel and 1 pair of sides that are not parallel. Ex.

7) If the area of a trapezoid is 48, and the bases
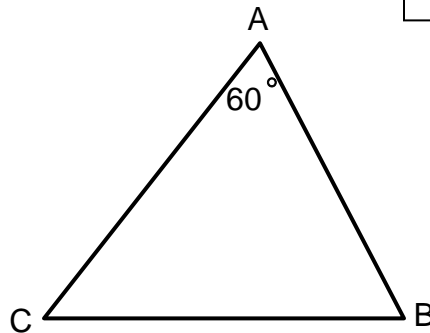   are 10 and 6, find the height
   of the trapezoid.

c) 6

$$A = \frac{1}{2}(b_1 + b_2)h$$

$$48 = \frac{1}{2}(10 + 6)h$$

$$48 = \frac{1}{2}(16)h$$

$$48 = 8h$$

$$h = 6$$

8) In triangle ABC, the measure of angle A is 60 degrees. If the measure of angle B is
   two times that of Angle C, we can conclude that:

**d) All of the angles are
   less than 90 degrees.**

Let $\angle C = x$ and $\angle B = 2x$

$x + 2x + 60 = 180$

$3x + 60 = 180$

$3x = 120$

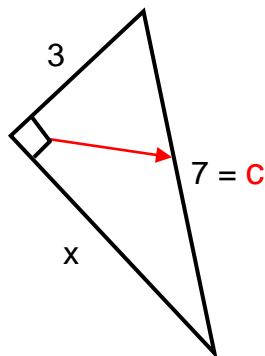$x = 40$

So...$\angle C = 40$ & $\angle B = 80$

All angles are less than $90°$.

9) Solve for x:

3

7 = C

x

b) $\sqrt{40}$
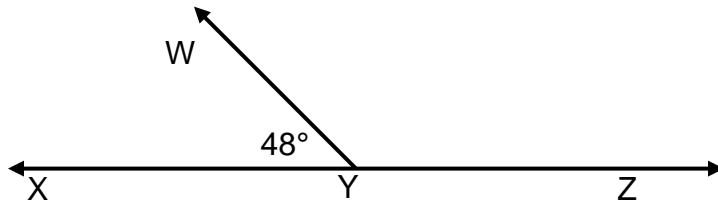
$$a^2 + b^2 = c^2$$

$$3^2 + x^2 = 7^2$$

$$9 + x^2 = 49$$

$$x^2 = 40$$

$$x = \sqrt{40}$$

W

48°

X   Y   Z

10) The measure of angle XYW is 48 degrees.
    What is the measure of angle WYZ?

Angles that form a straight line have a sum of 180.
180 – 48 = 132

   a) 132

11) How many 8 inch square tiles will it take to cover a rectangular kitchen floor that is 8 feet wide and 10 feet long?

   d) 180

**We need to change feet to inches so that we will have everything in the same units.**
8 feet = 8(12) = 96 inches
10 ft = 10(12) = 120 inches
Area = length x width
Area = 96(120) = 11520 sq. in.
An 8 inch square = 8 x 8 = 64 sq. in.
11520 divided by 64 = 180 tiles

B   C

A   D
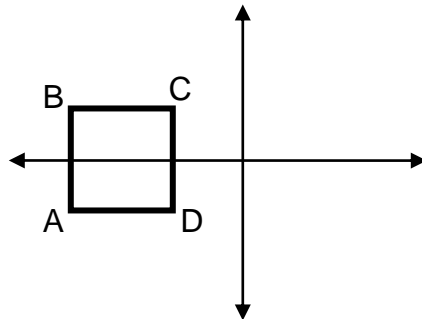
12) Square ABCD, above, has coordinates: C(-2, 2) and D(-2, -2). If the square is shifted to the right 5 and down 6, what will be the coordinates of point B?

   b)$(-1,-4)$

The length of side CD = 2 – (-2) = 4,
so each side of the square must be 4.
B is 4 units to the left of C so the coordinates of B are (-6,2).
Next, add 5 to the x-coordinate: -6 + 5 = -1
Subtract 6 from the y-coordinate: 2 – 6 = -4,
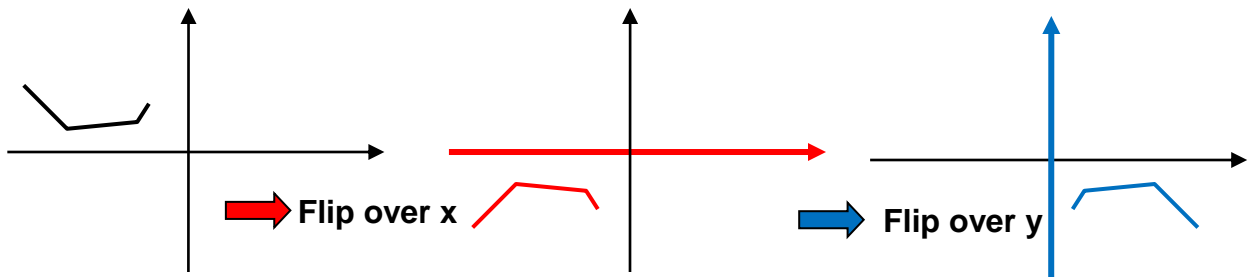**so the new coordinates of B will be (-1, -4).**
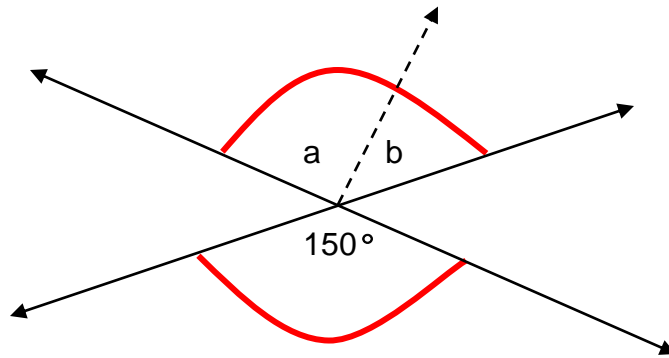
13) Which shows the correct possible values of *a* and *b* in the diagram above? Choose <u>all</u> that apply.
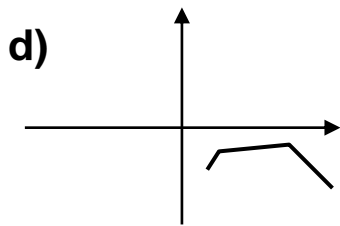
⊠ **a) 20 & 130**   ⊠ **c) 80 & 70**

⊠ **e) 75 & 75**

The angles *a* and *b* together form a vertical angle to the 150 degree angle, so a + b must equal 150. The choices that add up to 150 are: a, c, and e.

Flip over x

Flip over y

14) Which shows the reflection over the x-axis followed by a reflection over the y-axis of the figure above?
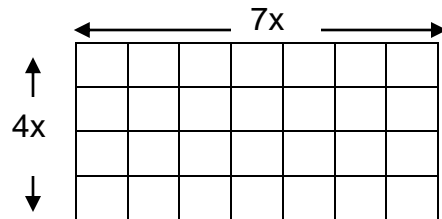
d)

15) An acute angle of a right triangle is 35 degrees. What is the measure of the other acute angle?

b) 55

> **The 3 angles of a triangle must add up to 180. A right triangle has one right angle in it = 90°.**
>
> **180 – 90 – 35 = 55**

7x

4x

16) The grid shown above has an area of 252. What is the length of the side of one of the squares?

c) 3

> **Let x = length of a side of one square.**
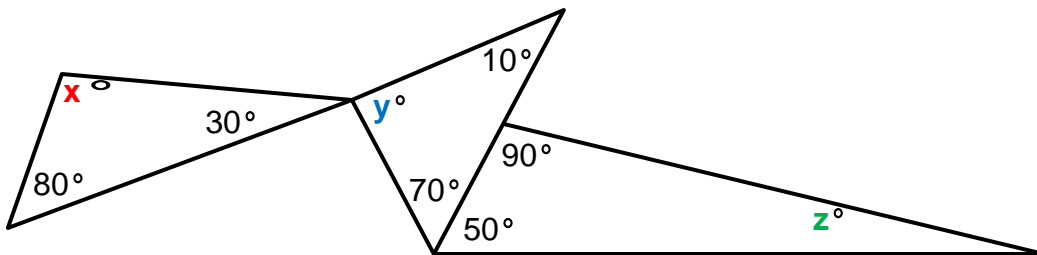> **The grid would be 4x by 7x.**
> **Area = length times width.**
> $$(4x)(7x) = 252$$
> $$28x^2 = 252$$
> $$x^2 = 9$$
> $$x = \sqrt{9}$$
> $$x = 3$$

x°
30°
80°
y°
10°
90°
70°
50°
z°

17) What is the value of x + y + z in the picture above?

b) 210

> **The sum of the angles of a triangle is always 180°,**
> **so x = 180 – 80 – 30 = 70,**
> **y = 180 – 10 – 70 = 100,**
> **and z = 180 – 90 – 50 = 40**
>
> **x + y + z = 70 + 100 + 40 = 210°**

18)

8 in.
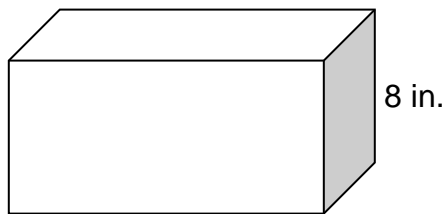
$V = L \bullet W \bullet H$

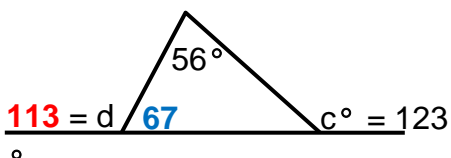**But notice that L $\bullet$ W = Area**

So you could re-write the formula as:

$V = \text{Area} \bullet H$

$V = 40 \bullet 8 = 320$

If the area of the top of this box is 40 square inches and the height of the box is 8 inches, which of the following would be a correct conclusion?
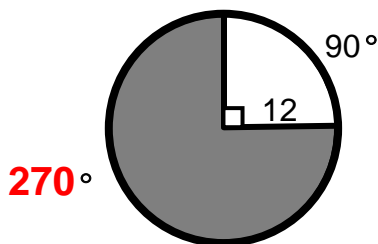
c) The volume of the box is 320 cubic inches.

56°

113 $= d$ **67** $c° = 123$

°

19) In the diagram above, if c = 123 degrees, what is d?

Since c = 123, the second remote angle is 123 – 56 or 67.

Angle *d* forms a straight line with the 67 so it is 180 – 67 = 113.

113

90°

12

270 °

20) If the radius of the circle above is 12, what is the area of the shaded region?

b) 108π

Did you notice that the angle for the shaded region is 360 - 90 = 270?

$A = \dfrac{n°}{360} \bullet \pi r^2$

$A = \dfrac{\textbf{270}}{360} \bullet \pi (12)^2$

$A = 108\pi$

Sales by Quarter

II	I
25%	9%
	III
IV	26%
40%	
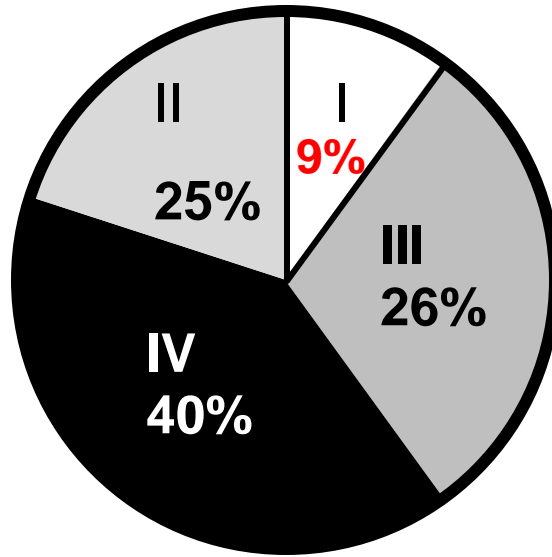
25% + 26% + 40% = 91%

Since the circle must represent 100%, take 91 away from 100 to get 9% for sales in the first quarter.

9% of 2.6 million = .09(2,600,000) = $234,000

21) The circle graph above represents the sales by quarter of a company. If the company sales for the year were 2.6 million dollars, how much did they make in sales in the 1ˢᵗ quarter?

<div align="center">

c) $234,000

</div>

22) A tire on a monster truck has a diameter of 40 inches. A tire on a bike has a diameter of 12 inches. Approximately, how many revolutions will the bike tire have to make to catch up with the monster truck after the truck has driven for 100 revolutions?

d) 333

1 revolution = 1 circumference

Truck: $C = d\pi = 40(3.14) = 125.6$

100 revolutions = $100(125.6) = 12,560$

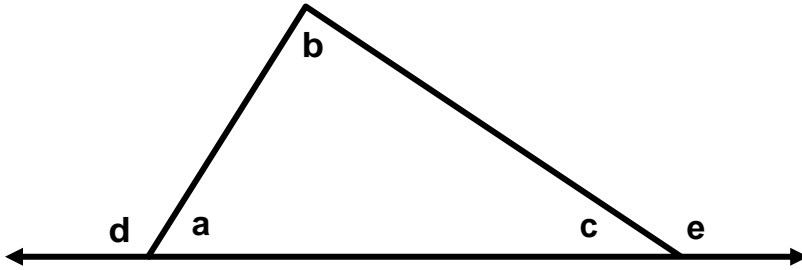**Bike : $C = d\pi = 12(3.14) = 37.68$**

Let R = # of revolutions bike needs

$37.68R = 12560$ divide by 37.68

$R = 333.33$

An exterior angle of a triangle is equal to the sum of the two remote interior angles so: d = b + c and e = a + b.

The sum of the angles of a triangle is 180, so a + b + c = 180.

Two angles that form a straight line have a sum of 180, so d + a = 180 or a = 180 − d.

So, the only one that is NOT true is choice d.

23) Which of the following is not true?

d) d = 180 − c

24) In triangle ABC, AB = BC and angle B = 112º. What is the value of Angle A?
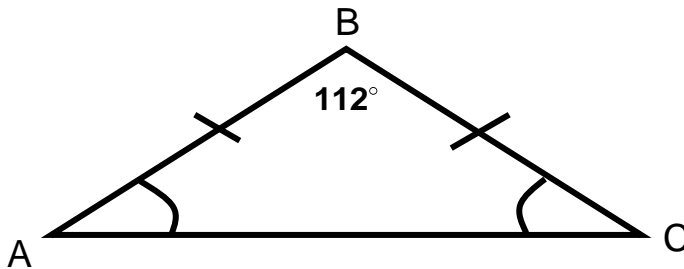
Since 2 sides are equal, the angles across from these sides are also equal.

180 − 112 = 68º

68 ÷ 2 = 34

b) 34

25) If the diagonal of a square is 20, what would be one of the sides?
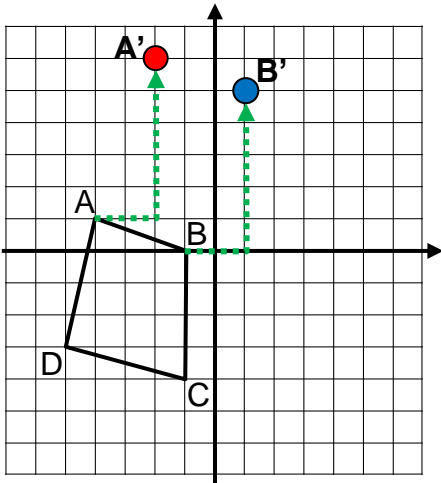

C) $10\sqrt{2}$
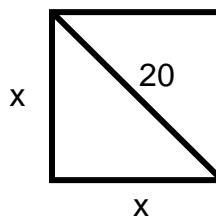
$$a^2 + b^2 = c^2$$
$$x^2 + x^2 = 20^2$$
$$2x^2 = 400$$
$$x^2 = 200$$
$$x = \sqrt{200}$$ **work backwards from answers**
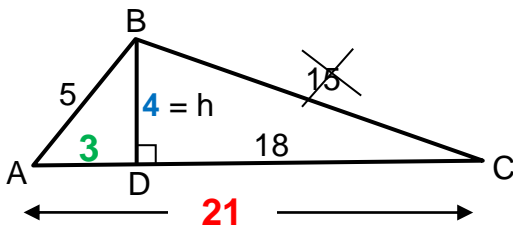$$10\sqrt{2} = \sqrt{100} \cdot \sqrt{2} = \sqrt{200}$$

To get point A (-4, 1) to the point A'(-2, 6) you would move two to the right and then UP 5. (Therefore k = 5).

Do the same with point B.
Move (-1, 0) two to the right and then up 5 and you will be at B'(1,5).

26) If a translation of 2 units right and *k* unit up moves point A to $(-2,6)$, what will be the new coordinates of B after the same translation?

b) $(1,5)$

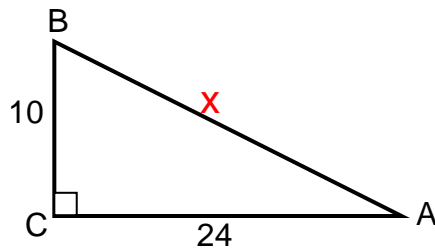27) What is the area of triangle ABC shown below?

AD = 3 since ABD is a 3-4-5 right triangle.
AC = the base = 3 + 18 = 21!

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2}(21)(4)$$

$$A = 42$$
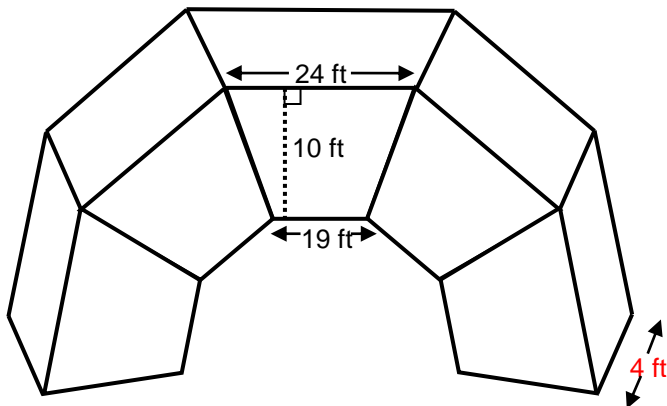
42

$$10^2 + 24^2 = x^2$$

$$100 + 576 = x^2$$

$$676 = x^2$$

$$x = \sqrt{676} = 26$$

So the perimeter of the triangle is 10 + 24 + 26 = 60

(We don't know anything about the angles. The area of the triangle would be

$$\frac{1}{2} \bullet 24 \bullet 10 = 120)$$

28) Which of the following statements is true about right triangle *ABC* above?

    e) The perimeter of the triangle is 60.

$$A = \frac{1}{2}(b_1 + b_2)h$$

$$A = \frac{1}{2}(24 + 19)10$$

$$A = 215$$

The VOLUME of 1 trapezoid = area of base x "height" = 215 • 4 = 860

**The volume of all 5 stones = 5 • 860 = 4,300**

29) The arch above is constructed of 5 nearly congruent stones, each of which is in the shape of a right prism with trapezoid bases. Based on the approximate measurements provided, which of the following best approximates the volume of the entire arch?

The area of a trapezoid with bases b_1 and b_2 and height h is $\frac{1}{2}(b_1 + b_2)h$.

    e) 4,300 cu. ft.

30) Find the volume of the triangular prism below. The volume of a prism is $V = Bh$ where B represents the area of the base.

12 m 5 m

18 m
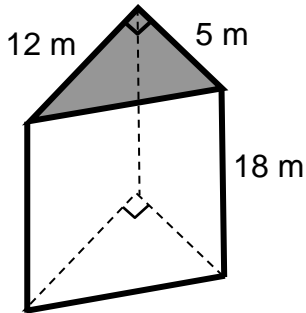
$V = Bh$

Since the base is a triangle,

$B =$ formula for area of a triangle.

$V = \left(\dfrac{1}{2}b_\blacktriangle h_\blacktriangle\right)h_{prism}$

$V = \left(\dfrac{1}{2} \bullet 5 \bullet 12\right)18$

$V = 540$

540

31) The volume of a box is 720 cubic feet. The height is 10 feet, and the width is 8 feet. What is the length of the box?
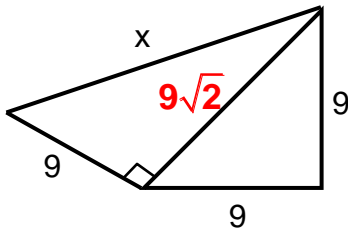
$V = L \bullet W \bullet H$

$720 = L(8)(10)$

$720 = 80L$

$L = 9$

e) 9

32) Find the value of x:

x

$9\sqrt{2}$

9

9

9

b) $9\sqrt{3} = 15.6$

$9\sqrt{2} = 12.7$

$(12.7)^2 + 9^2 = x^2$
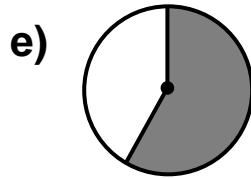
$161.2 + 81 = x^2$

$242.2 = x^2$

$x = \sqrt{242.2}$

$x = 15.6$

33) Last year 58 percent of the total number of complaints made to a company were about delays in shipping. In which of the following circle graphs does the shaded area represent the fraction of the total number of complaints made that were about shipping delays last year?

e)

> **58% is a little more than half so just pick the graph that has a little more than half of it shaded.**
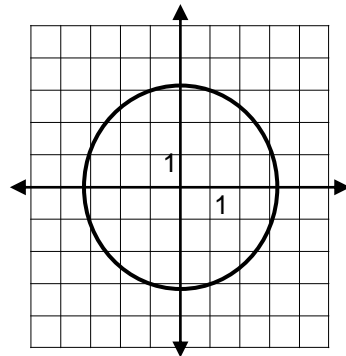
34) Which of the following best approximates the area of the circle shown in the graph above?

d) 32

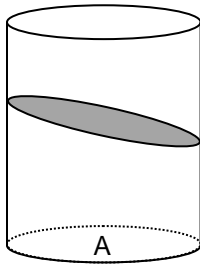$$\text{Area}_{circle} = \pi r^2$$

We have to estimate the radius.

Let's say it is 3.2

$$A = (3.14)(3.2)^2 \text{ Be sure to square first!}$$

$$A = (3.14)(10.24)$$

$$A = 32.15$$

A

35) A right circular cylinder with base *A* is shown. If a plane that is neither parallel nor perpendicular to base *A* passes through the cylinder, which of the following could be the shape of the intersection of the plane and the cylinder?

b) An ellipse with circumference greater than the circumference of *A*

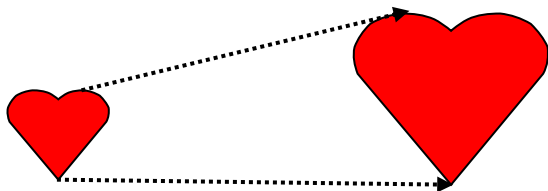36) Which of the following could be the measures of angles of a triangle?

d) $90°, 43°, 47°$

> **These are the only angles whose sum is the required 180 degrees.**

37) An aquarium tank is 3 feet long, 1 foot wide, and 2 feet high. How many gallons of water would it take to fill the tank ***two-thirds full***? (A cubic foot is about **7.5 gallons**.)

> $V = L \bullet W \bullet H$
>
> $V = (3)(1)(2)$
>
> $V = 6$ **but they only want it 2/3 full**
>
> $\dfrac{2}{3} \bullet 6 = 4$ **still not the answer**
>
> $\dfrac{4 \text{ cu. ft}}{1} \text{ x } \dfrac{7.5 \text{ gallons}}{\text{cu.ft}} = 30 \text{ gallons}$
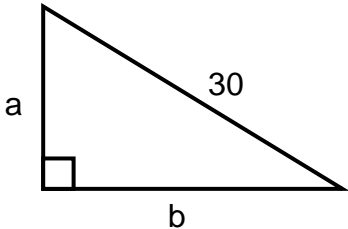
d) 30

The heart is made larger so it is a dilation.

38) This figure above is an example of a(n) -

d) dilation

30

a

b

39) Which of the following could be the values of *a* and *b* in the right triangle above?

Use the 3-4-5 "trick".
3 – 4 – 5
x6   x6   x6
18 – 24 – 30

<u>a</u>   <u>b</u>

b) 18   24

40) A company has 80 million dollars in total expenses for one year. A circle graph shows a sector of 270 degrees representing employee salaries. How many <u>millions</u> of dollars were spent on employee salaries?

60

270 out of 360 degrees =

$\dfrac{270}{360} = .75$

$.75(80) = \mathbf{60}$

41) The circumference of a circular rug is 136.6 in. What is the approximate diameter of the rug?

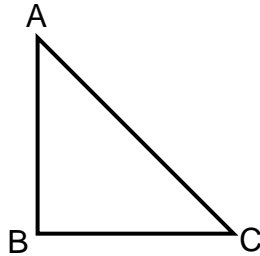**a) 43.5**

Circumference = diameter x pi

$$136.6 = d(3.14)$$

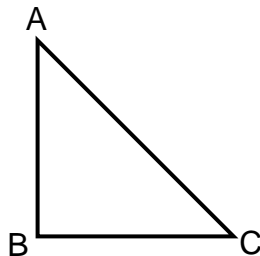$$\frac{136.6}{3.14} = \frac{d(3.14)}{3.14}$$

$$43.5 = d$$

A

B   C

42) In right triangle ABC, AB = 50 and BC = 50. Approximately how long is AC?

a) $50\sqrt{2}$

Remember the shortcut!

If the two legs of a right triangle are equal, then the hypotenuse is equal to the leg times the square root of 2.

Answer: $50\sqrt{2}$

A

B   C

43) In right triangle ABC, AB = 80 and BC = 80. Approximately how long is AC?
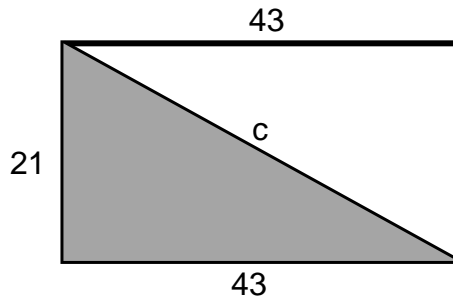
b) 113

Remember the shortcut!

If the two legs of a right triangle are equal, then the hypotenuse is equal to the leg times the square root of 2.
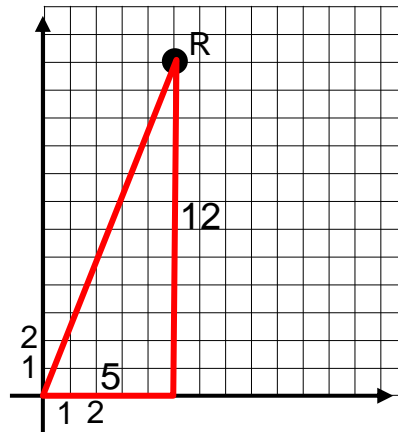
Answer: $80\sqrt{2} \approx 113$

43

$$a^2 + b^2 = c^2$$

$$21^2 + 43^2 = c^2$$

$$2290 = c^2$$

$$c = \sqrt{2290} = 47.9$$

21

c

43

44) What is the length of the diagonal in the rectangle above?

d) 47.9

R

12

2
1

5

1 2

45) What is the distance of point R from the origin?

Draw a line from R to the origin (0,0). Then make a right triangle. Count the length of the sides and you will see they are 5 and 12. Then use the Pythagorean Theorem to find the hypotenuse.
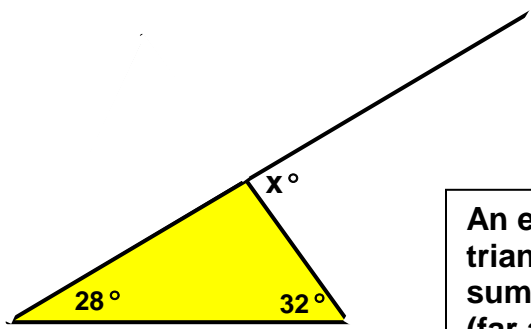
$$a^2 + b^2 = c^2$$

$$5^2 + 12^2 = c^2$$

$$25 + 144 = c^2$$

$$169 = c^2$$

$$c = \sqrt{169} = 13$$

e) 13

x°

28° 32°

An exterior angle of a triangle is equal to the sum of the two remote (far away) angles.

$x = 28 + 32 = 60$

46) What is the value of x in the picture above?

e) 60

47) A triangle has sides of lengths 3, 5, and *x*. Which of the following could be the value of *x*?   Indicate <u>all</u> such values.
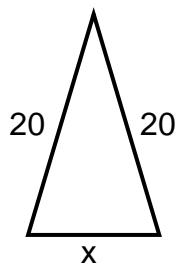
☒ **b) 2.3**   ☒ **c) 6.5**

The third side of a triangle must be between the difference and the sum of the other two sides.

$5 - 3 < x < 5 + 3$

$2 < x < 8$

X must be between 2 and 8.

20   20

x

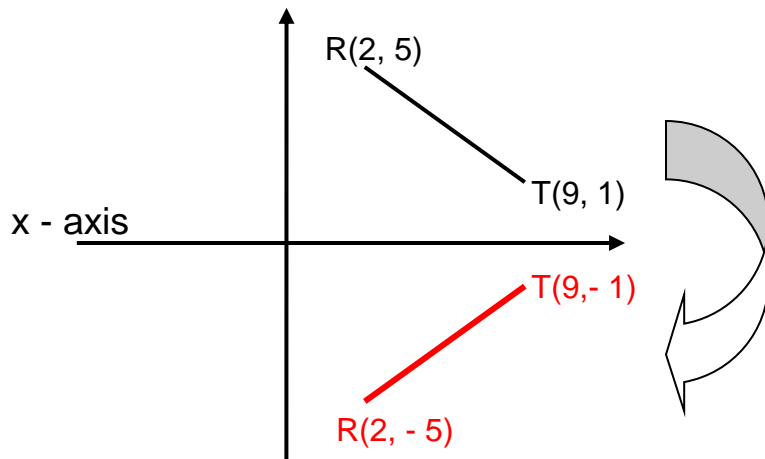48) In the triangle above, x could be any number <u>**except:**</u>

The third side of a triangle must be between the difference and the sum of the other two sides.

$20 - 20 < x < 20 + 20$

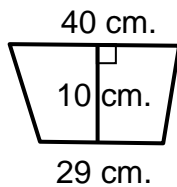$0 < x < 40$ So, x must be between 0 and 40.

The side cannot be equal to 40.

e) 40

R(2, 5)

T(9, 1)

x - axis

T(9,- 1)

R(2, - 5)

49) If the segment RT is reflected across the **x-axis** to the new coordinates R'T', which of the following could be the coordinates of R' and T'?

c) $(2,-5)\ (9,-1)$

50) What is the area of the trapezoid shown below?
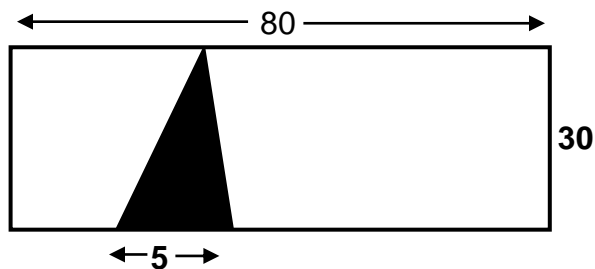
40 cm.

10 cm.

29 cm.

d) 345

$$A_{\textbf{trapezoid}} = \frac{1}{2}(b_1 + b_2)h$$

$$A = \frac{1}{2}(29 + 40)(10)$$

$$A = \frac{1}{2}(69)(10)$$

$$A = 345$$

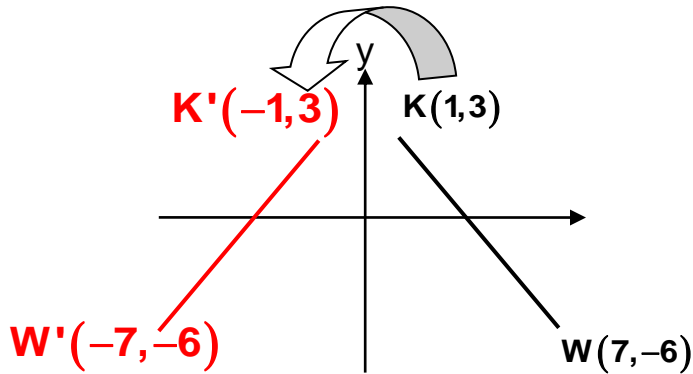51) What is the area of the shaded triangle in the rectangle below?

80

30

←5→

The height of the triangle is the same as the width of the rectangle = 30.

Area of a triangle = $\frac{1}{2}$**bh**

$$A = \frac{1}{2}(5)(30)$$

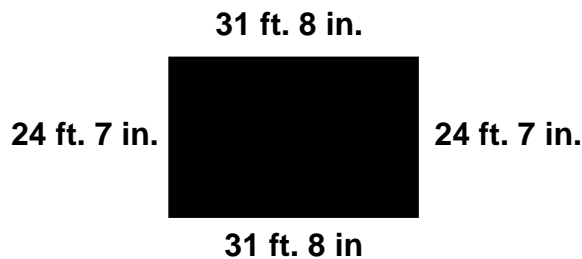$$A = 75$$

75

K'(−1,3)   K(1,3)

W'(−7,−6)   W(7,−6)

52) If the segment KW is reflected across the <u>y-axis</u> to the new coordinates K'W',
which of the following could be the coordinates of K' and W'?

$$c)\ (-1,3)\ (-7,-6)$$

53) A rectangle has a length of 31 feet 8 inches and a width of 24 feet and 7 inches.
What is the perimeter of the rectangle?

c) 112 ft. 6 in.

31 ft. 8 in.

24 ft. 7 in.   24 ft. 7 in.

31 ft. 8 in

To find the perimeter, we add two lengths and two widths:
31 ft 8 in
31 ft 8 in
24 ft 7 in
+ 24 ft 7 in
<u>110 ft 30 in</u> = **112 ft 6 in.**
[30 in = 2 feet (24 in) + 6 in.]

54) If the circumference of a circle is 109.9 feet, which of the following is closest to the
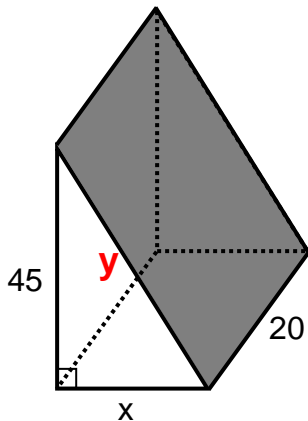area of the circle?

a) **962**

$C = d\pi$

$109.9 = d\pi$ **Divide both sides by** π.

$d = 35$ **The radius = 35/2 = 17.5**

$A = \pi r^2$

$A = (3.14)(17.5)^2$

$A = 961.625$

10 in.

4 in.
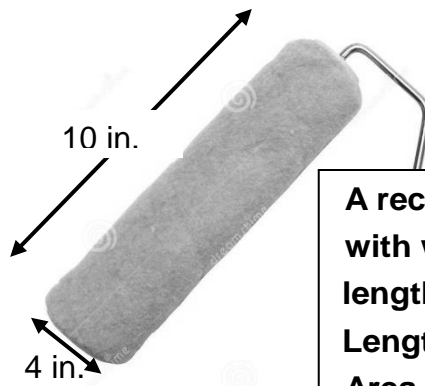
A rectangle will be created
with width = 10 in and
length = circumference of the roller.
Length = C = dπ = 4π
Area = length x width
A = 10(4π) = **40π**

55) Allie is getting ready to paint her room with the paint roller shown above.
What area will the roller cover in one rotation?

a) 40π

First find the length of the rectangle. I'll call it y.
Area of a rectangle = length x width
Let L = the length
1000 = 20L divide by 20
L = 50
Then use the Pythagorean Theorem to find x.
$a^2 + b^2 = c^2$
$x^2 + 45^2 = 50^2$
$x^2 + 2025 = 2500$
$x = \sqrt{475}$
$x = 21.79 = \mathbf{21.8}$ to the nearest 10th

45

y

20

x

56) A right triangular prism is shown above. If the area of the shaded rectangle is
1000, what is the value of x to the nearest tenth?

21.8

Bonus: What is the sum of the angles of a triangle in Egypt?

180

The sum of the angles of a triangle is ALWAYS 180 degrees. It doesn't
matter what country it is in the world. That is why
MATH IS CALLED THE UNIVERSAL LANGUAGE!! 😊