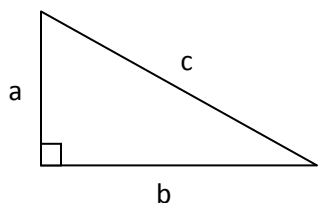


ACT COMPASS Review Packet Contents: Geometry

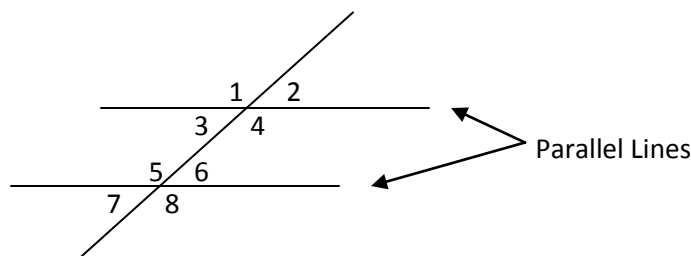
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Tips

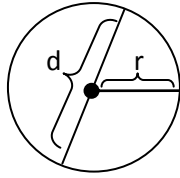
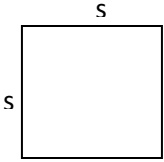
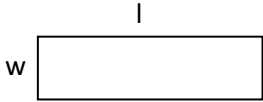
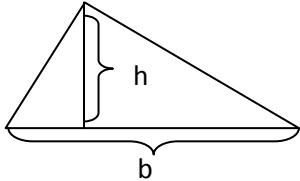
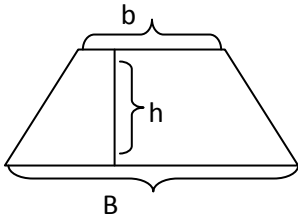
- **Pythagorean Theorem: When looking for the length in one right triangle, you will probably use $a^2 + b^2 = c^2$. Refer to questions 1-4.**



- It doesn't matter which leg is "a" and which is "b," but "c" must be the side across from the right angle; "c" is referred to as the hypotenuse.
 - $a \text{ or } b = \text{leg} = \sqrt{(\text{hypotenuse})^2 - (\text{other leg})^2}$
 - $c = \text{hypotenuse} = \sqrt{(\text{leg } a)^2 + (\text{leg } b)^2}$
- **Similar Triangles: When looking for a length in two different sized triangles, assume that they are similar triangles. Similar triangles have proportional sides. Refer to questions 5-6.**
 - **Finding Angles: When looking for the measure of an angle, just remember that the 3 angles of any triangle add up to 180° . Refer to questions 8-13.**
 - Similarly, a straight angle equals 180° .
 - Angles across from equal length sides in a triangle are equal.
 - In the case of parallel lines, any 2 angles are either equal or add up to 180° .



Formulas

<ul style="list-style-type: none"> • Circle: Refer to questions 4, 7, 8, 11, and 14-17 <ul style="list-style-type: none"> ○ $Radius = r = \frac{d}{2}$ ○ $Diameter = d = 2r$ ○ $Area = \pi r^2$ ○ $Circumference = 2\pi r = \pi d$ ○ <i>All radii of the same circle are equal.</i> 	
<ul style="list-style-type: none"> • Square: Refer to questions 3 and 15 <ul style="list-style-type: none"> ○ $Side = s$ ○ $Area = s \times s$ 	
<ul style="list-style-type: none"> • Rectangle: Refer to questions 1, 2, 19, and 20 <ul style="list-style-type: none"> ○ $Length = l$ ○ $Width = w$ ○ $Area = l \times w$ ○ <i>Both diagonals of a rectangle are equal.</i> 	
<ul style="list-style-type: none"> • Triangle: Refer to questions 1-6, and 8-11 <ul style="list-style-type: none"> ○ $Base = b$ ○ $Height = h$ ○ $Area = \frac{1}{2}bh$ 	
<ul style="list-style-type: none"> • Trapezoid: Refer to question 18 <ul style="list-style-type: none"> ○ $Larger\ Base = B$ ○ $Smaller\ Base = b$ ○ $Height = h$ ○ $Area = \frac{1}{2}h(B + b)$ 	
<p><i>The perimeter of any figure is the sum of its sides.</i></p>	

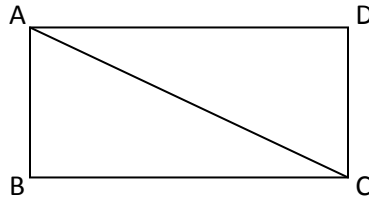
Sample Problems

1. If the length of a rectangle is 12 units and its width is 9 units, what is the length of its diagonal?

- 10 units
- 12 units
- 13 units
- 15 units
- 21 units

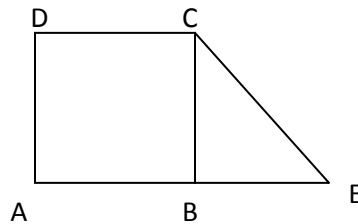
2. If $\overline{AC} = 10$ units and $\overline{AB} = 4$ units, then what is \overline{AD} ?

- 6 units
- $2\sqrt{21}$ units
- $\sqrt{89}$ units
- 10 units
- 40 units



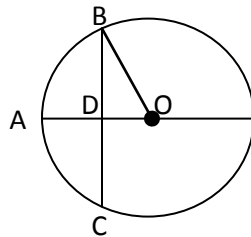
3. If the area of the square is 100 units² and $\overline{CE} = 12$ units, what is \overline{BE} ?

- $2\sqrt{11}$ units
- $\sqrt{83}$ units
- 10 units
- 12 units
- 14 units



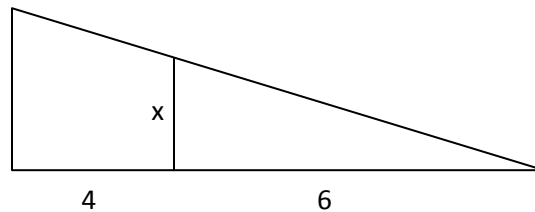
4. O is the center of the circle; the radius of this circle is 7 units. \overline{BC} is 8 units. \overline{OA} bisects \overline{BC} . What is \overline{OD} ?

- 7 units
- 8 units
- 10 units
- $\sqrt{65}$ units
- $\sqrt{33}$ units



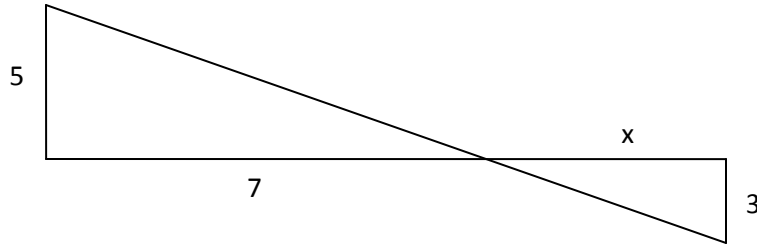
5. Find x .

- 5 units
- $\frac{10}{42}$ units
- $\frac{21}{5}$ units
- 6 units
- $\frac{10}{7}$ units



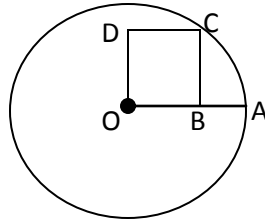
6. Find x .

- a. 5 units
- b. $\frac{21}{5}$ units
- c. 4 units
- d. $\frac{7}{3}$ units
- e. $\frac{35}{3}$ units



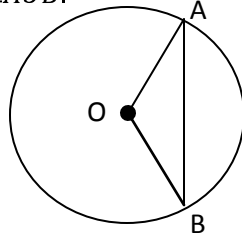
7. If $\overline{OA} = 9$ units, and $\overline{OB} = 6$ units, then find \overline{DB} .

- a. 9 units
- b. 6 units
- c. 15 units
- d. 3 units
- e. 5 units



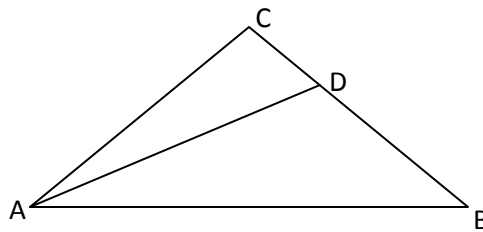
8. If $\angle OBA = 33^\circ$, then find $\angle AOB$.

- a. 33°
- b. 147°
- c. 157°
- d. 114°
- e. 120°



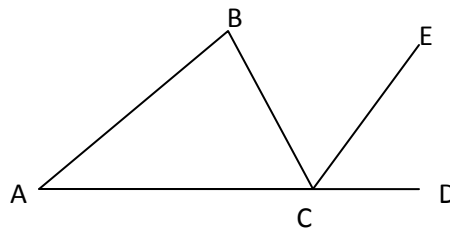
9. If $\overline{AC} = \overline{BC}$, and $\angle BAC = 47^\circ$, and $\angle ADB = 91^\circ$, then find $\angle DAB$.

- a. 30°
- b. 36°
- c. 42°
- d. 47°
- e. 91°



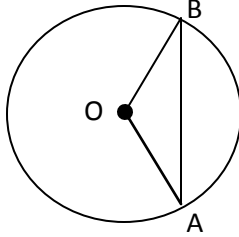
10. If $\angle BAC = 70^\circ$, and $\angle ABC = 60^\circ$, and \overline{CE} bisects $\angle BCD$, then find $\angle BCE$.

- a. 55°
- b. 60°
- c. 65°
- d. 70°
- e. 75°



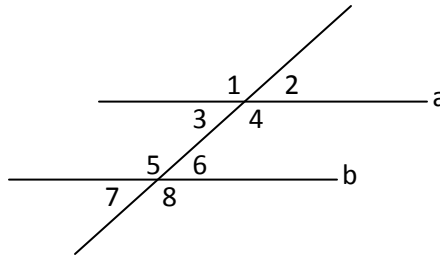
11. If $\angle BOA = 120^\circ$, then find $\angle ABO$

- a. 120°
- b. 60°
- c. 80°
- d. 15°
- e. 30°



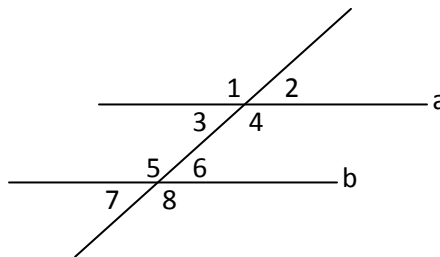
12. If lines a and b are parallel, which angles have the same measure as $\angle 1$?

- a. $\angle 2, \angle 3$, and $\angle 6$
- b. $\angle 5, \angle 6$, and $\angle 8$
- c. $\angle 2, \angle 3$, and $\angle 4$
- d. All of the angles
- e. $\angle 4, \angle 5$, and $\angle 8$



13. If lines a and b are parallel, and $\angle 1 = 135^\circ$, then find $\angle 6$.

- a. 135°
- b. 45°
- c. 180°
- d. 35°
- e. 100°



14. If the circumference of a circle is 14π units, what is the radius?

- a. 7 units
- b. 14 units
- c. 28 units
- d. 7π units
- e. 12 units

15. What is the area of a circle inscribed with a square whose sides are 16 units long each?

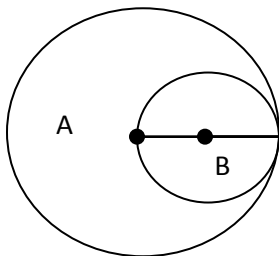
- a. 64 units^2
- b. 8 units^2
- c. $8\pi \text{ units}^2$
- d. $64\pi \text{ units}^2$
- e. $4\pi \text{ units}^2$

16. If the area of a circle is $25\pi \text{ units}^2$, then what is the circle's diameter?

- a. 25 units
- b. 5 units
- c. $\sqrt{5}$ units
- d. 50 units
- e. 10 units

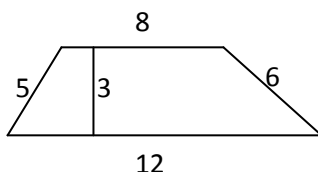
17. If the diameter of Circle A is 20 units, what area remains if Circle B is removed from Circle A?

- a. $75\pi \text{ units}^2$
- b. $100\pi \text{ units}^2$
- c. 50 units^2
- d. 75 units^2
- e. $25\pi \text{ units}^2$



18. What is the area of this figure?

- a. 10 units^2
- b. 20 units^2
- c. 30 units^2
- d. 40 units^2
- e. 50 units^2



19. If the length and the width of a rectangle are tripled, by how many times does the area increase?

- a. 3
- b. 6
- c. 27
- d. 9
- e. 12

20. If a rectangular room, measuring 12 feet X 15 feet, is to be tiled with tiles that have 9 inch sides, how many tiles are needed to complete this room?

- a. 50 tiles
- b. 100 tiles
- c. 150 tiles
- d. 200 tiles
- e. 320 tiles

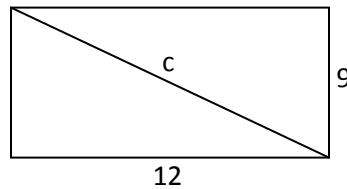
Answers

1.	D	2.	B	3.	A	4.	E
5.	C	6.	B	7.	A	8.	D
9.	C	10.	C	11.	E	12.	E
13.	B	14.	A	15.	D	16.	E
17.	A	18.	C	19.	D	20.	E

Solutions

1. If the length of a rectangle is 12 units and its width is 9 units, what is the length of its diagonal?

- 10 units
- 12 units
- 13 units
- 15 units**
- 21 units

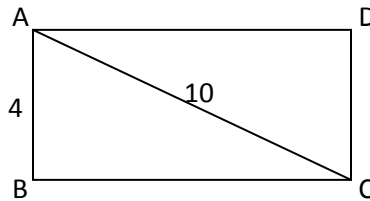


$$9^2 + 12^2 = c^2$$

$$c = \sqrt{81 + 144} = 15$$

2. If $\overline{AC} = 10$ units and $\overline{AB} = 4$ units, then what is \overline{AD} ?

- 6 units
- $2\sqrt{21}$ units**
- $\sqrt{89}$ units
- 10 units
- 40 units



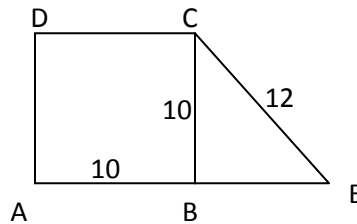
$$\overline{AD} = \overline{BC}$$

$$\overline{BC} = \sqrt{10^2 - 4^2} = \sqrt{84}$$

$$\sqrt{84} = \sqrt{4 \times 21} = \sqrt{4} \times \sqrt{21} = 2\sqrt{21}$$

3. If the area of the square is 100 units² and $\overline{CE} = 12$ units, what is \overline{BE} ?

- $2\sqrt{11}$ units**
- $\sqrt{83}$ units
- 10 units
- 12 units
- 14 units



If the area of the square is 100, then each side must be 10.

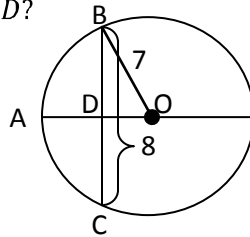
$$\overline{BE} = \sqrt{12^2 - 10^2} = \sqrt{144 - 100}$$

$$\sqrt{44} = 2\sqrt{11}$$

4. O is the center of the circle; the radius of this circle is 7 units. \overline{BC} is 8 units.

\overline{OA} bisects \overline{BC} . What is \overline{OD} ?

- 7 units
- 8 units
- 10 units
- $\sqrt{65}$ units
- $\sqrt{33}$ units**



If \overline{OA} bisects \overline{BC} , which is 8 units long, \overline{BD} must be 4 units long.

$$\overline{OD} = \sqrt{7^2 - 4^2} = \sqrt{49 - 16} = \sqrt{33}$$

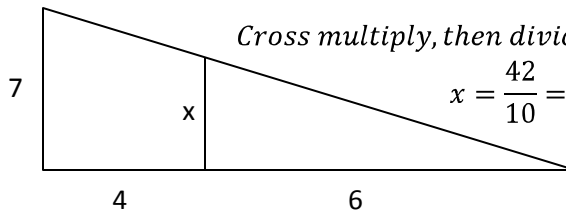
5. Find x .

- 5 units
- $\frac{10}{42}$ units
- $\frac{21}{5}$ units**
- 6 units
- $\frac{10}{7}$ units

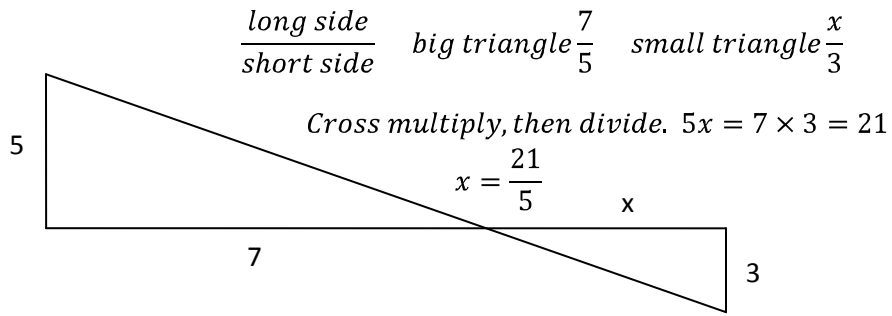
Remember that similar triangles have proportional sides. $\frac{\text{long side}}{\text{short side}}$ big triangle $\frac{10}{7}$ small triangle $\frac{6}{x}$

Cross multiply, then divide. $10x = 7 \times 6 = 42$

$$x = \frac{42}{10} = \frac{21}{5}$$

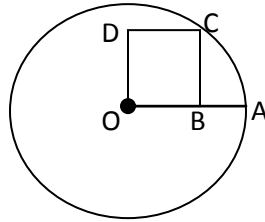


6. Find x .
- 5 units
 - $\frac{21}{5}$ units
 - 4 units
 - $\frac{7}{3}$ units
 - $\frac{35}{3}$ units



7. If $\overline{OA} = 9$ units, and $\overline{OB} = 6$ units, then find \overline{DB} .

- 9 units
- 6 units
- 15 units
- 3 units
- 5 units

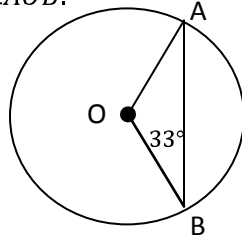


If $\overline{OA} = 9$ then $\overline{OC} = 9$;
(Radii of the same circle)

If $\overline{OC} = 9$, then $\overline{DB} = 9$;
(diagonals of the same rectangle)
You just need to ignore the extra information.

8. If $\angle OBA = 33^\circ$, then find $\angle AOB$.

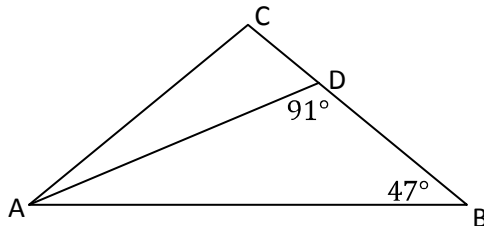
- 33°
- 147°
- 157°
- 114°**
- 120°



If $\angle OBA = 33^\circ$, then $\angle OAB = 33^\circ$.
 $\overline{OA} = \overline{OB}$ because radii of the same circle are equal.
 $\therefore \angle OBA = \angle OAB$ because angles across from equal sides are equal.
 $\angle AOB = 180^\circ - 33^\circ - 33^\circ = 114^\circ$

9. If $\overline{AC} = \overline{BC}$, and $\angle BAC = 47^\circ$, and $\angle ADB = 91^\circ$, then find $\angle DAB$.

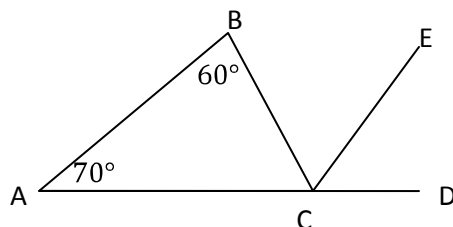
- 30°
- 36°
- 42°**
- 47°
- 91°



$\overline{AC} = \overline{BC} \therefore \angle BAC = \angle CBA$
 $\angle DAB = 180^\circ - 91^\circ - 47^\circ = 42^\circ$

10. If $\angle BAC = 70^\circ$, and $\angle ABC = 60^\circ$, and \overline{CE} bisects $\angle BCD$, then find $\angle BCE$.

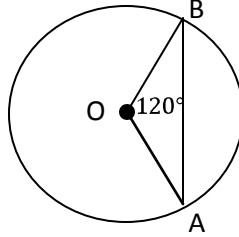
- 55°
- 60°
- 65°**
- 70°
- 75°



$\angle ACB = 180^\circ - 60^\circ - 70^\circ = 50^\circ$
 $\angle BCD = 180^\circ - 50^\circ = 130^\circ$
Straight angles = 180°
To bisect means to cut in half \therefore
 $\angle BCE = \frac{130^\circ}{2} = 65^\circ$

11. If $\angle BOA = 120^\circ$, then find $\angle ABO$

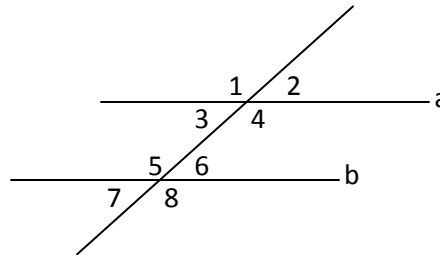
- a. 120°
- b. 60°
- c. 80°
- d. 15°
- e. **30°**



$\angle BOA = 120^\circ$; this means that the sum of the remaining two angles equals 60° . The other two angles must be equal, so $\angle ABO = \frac{60^\circ}{2} = 30^\circ$

12. If lines a and b are parallel, which angles have the same measure as $\angle 1$?

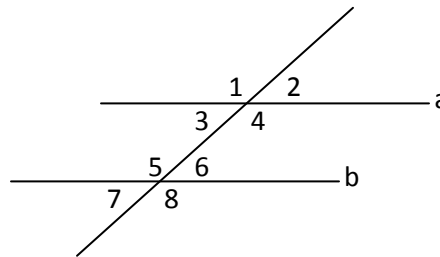
- a. $\angle 2, \angle 3$, and $\angle 6$
- b. $\angle 5, \angle 6$, and $\angle 8$
- c. $\angle 2, \angle 3$, and $\angle 4$
- d. All of the angles
- e. **$\angle 4, \angle 5$, and $\angle 8$**



Remember that in the case of parallel lines, angles across from one another are equal, and two angles next to each other add up to 180° .

13. If lines a and b are parallel, and $\angle 1 = 135^\circ$, then find $\angle 6$.

- a. 135°
- b. **45°**
- c. 180°
- d. 35°
- e. 100°



Remember that in the case of parallel lines, angles across from one another are equal, and two angles next to each other add up to 180° .

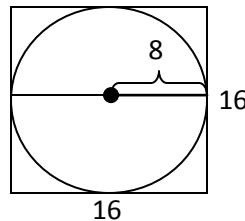
14. If the circumference of a circle is 14π units, what is the radius?

- a. **7 units**
- b. 14 units
- c. 28 units
- d. 7π units
- e. 12 units

$$\begin{aligned} \text{Circumference} &= \pi d = 2\pi r \\ 2\pi r &= 14\pi \\ r &= \frac{14\pi}{2\pi} = 7 \end{aligned}$$

15. What is the area of a circle inscribed with a square whose sides are 16 units long each?

- a. 64 units^2
- b. 8 units^2
- c. $8\pi \text{ units}^2$
- d. **$64\pi \text{ units}^2$**
- e. $4\pi \text{ units}^2$



$$\begin{aligned} \text{Diameter} &= 2 \times \text{radius} \\ \text{Area} &= \pi r^2 = \pi(8^2) = 64\pi \end{aligned}$$

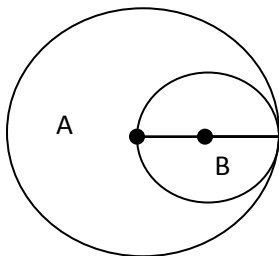
16. If the area of a circle is 25π units², then what is the circle's diameter?

- a. 25 units
- b. 5 units
- c. $\sqrt{5}$ units
- d. 50 units
- e. **10 units**

$$\begin{aligned} \text{Area} &= \pi r^2 = 25\pi & \text{Diameter} &= 2r \\ r^2 &= \frac{25\pi}{\pi} & \text{Diameter} &= 2 \times 5 \\ r &= \sqrt{25} = 5 & \text{Diameter} &= 10 \end{aligned}$$

17. If the diameter of Circle A is 20 units, what area remains if Circle B is removed from Circle A?

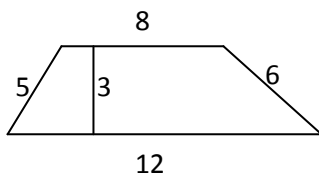
- a. $75\pi \text{ units}^2$
- b. $100\pi \text{ units}^2$
- c. 50 units^2
- d. 75 units^2
- e. $25\pi \text{ units}^2$



Diameter for Circle A = 20 units
 Radius for Circle A = 10 units
 Radius for Circle B = 5 units
 Area for Circle A = $\pi(10^2) = 100\pi$
 Area for Circle B = $\pi(5^2) = 25\pi$
 Area for Circle A – Area for Circle B = 75π

18. What is the area of this figure?

- a. 10 units^2
- b. 20 units^2
- c. 30 units^2
- d. 40 units^2
- e. 50 units^2



This figure is a trapezoid.
 Area = $\frac{1}{2}h(B + b) = \frac{1}{2}(3)(12 + 8)$
 $= \frac{1}{2}(3)(20) = \frac{1}{2}(60) = 30$

19. If the length and the width of a rectangle are tripled, by how many times does the area increase?

- a. 3
- b. 6
- c. 27
- d. **9**
- e. 12

Area for Rectangle 1 = $l \times w$
 Area for Rectangle 2 = $3l \times 3w = 9lw$

20. If a rectangular room, measuring 12 feet X 15 feet, is to be tiled with tiles that have 9 inch sides, how many tiles are needed to complete this room?

- a. 50 tiles
- b. 100 tiles
- c. 150 tiles
- d. 200 tiles
- e. **320 tiles**

First, make all units the same; usually the smallest unit is the preferred unit. Convert the 12 feet \times 15 feet room to 144 inches \times 180 inches; one foot = 12 inches.
 Area of room = 144 inches \times 180 inches = 25,920 inches²
 Area of tile = 9 inches \times 9 inches = 81 inches²
 $\frac{25920 \text{ inches}^2}{81 \text{ inches}^2} = 320 \text{ tiles}$