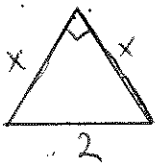
1.

What is the area of an isosceles right triangle with a hypotenuse of 2?



$x^2 + x^2 = 2^2$

$2x^2 = 4$

$x^2 = 2$

$x = \sqrt{2}$

$A = \frac{1}{2} \cdot x \cdot x = \frac{1}{2} \cdot \sqrt{2} \cdot \sqrt{2} = 1$

2.

What is the length of the hypotenuse of an isosceles right triangle with an area of 32?

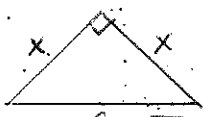
(A) 4

(B) $4\sqrt{2}$

(C) 8

(D) $8\sqrt{2}$

(E) $\sqrt{3}$



$c = \sqrt{x^2 + x^2} = \sqrt{2}x$

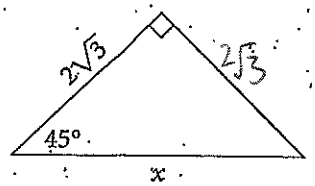
$A = \frac{1}{2} \cdot x \cdot x = \frac{1}{2}x^2 = 32$

$x^2 = 64$

$x = 8$

$c = \sqrt{2}x = \sqrt{2} \cdot 8 = 8\sqrt{2}$

3.



In the figure above, what is the measure of x?

(A) $2\sqrt{3}$

(B) $2\sqrt{6}$

(C) 6

(D) $6\sqrt{2}$

(E) 8

$x^2 = (2\sqrt{3})^2 + (2\sqrt{3})^2$

$x^2 = 12 + 12$

$x^2 = 24$

$x = \sqrt{24} = \sqrt{6 \cdot 4} = 2\sqrt{6}$

4.

What is the volume of a cube with a surface area of 96?

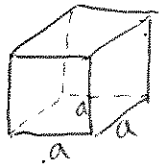
(A) 8

(B) 16

(C) 27

(D) 48

(E) 64

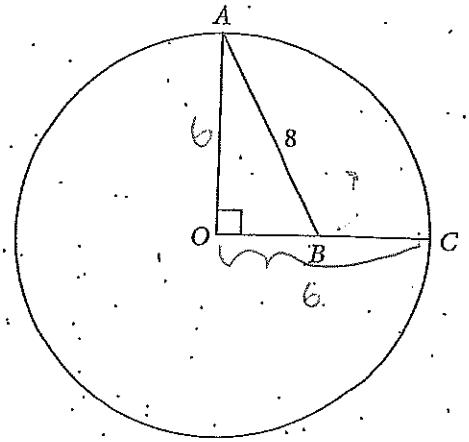


~~$V = a^3 = 96 \Rightarrow a = \sqrt[3]{96} =$~~

$S = 6 \cdot (a^2) = 96 \Rightarrow a^2 = 16 \Rightarrow a = 4$

$V = a^3 = 4^3 = 64$

5.



In the figure above, circle O has a circumference of 12π. If $AB = 8$, what is the length of BC?

(A) $2\sqrt{7}$

(B) $2(3 - \sqrt{7})$

(C) $2(6 - \sqrt{7})$

(D) $4\sqrt{5}$

(E) $2(3 - 2\sqrt{5})$

$C = 2\pi r = 12\pi$

$\Rightarrow r = 6 \Rightarrow |AO| = |OC| = 6$

$|OB|^2 + |AO|^2 = |AB|^2$

$|OB|^2 + 36 = 64$

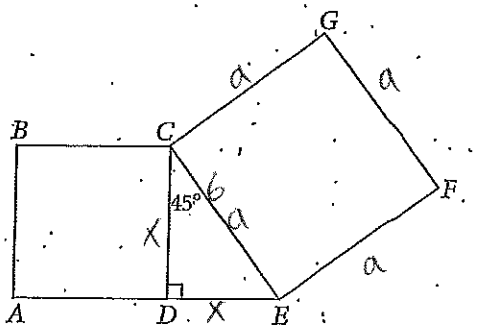
$|OB|^2 = 28$

$|OB| = \sqrt{28} = \sqrt{4 \cdot 7} = 2\sqrt{7}$

$|BC| = |OC| - |OB|$

$= 6 - 2\sqrt{7} = 2(3 - \sqrt{7})$

6



In the figure above, $ABCD$ and $CEFG$ are squares. If the area of $CEFG$ is 36, what is the area of $ABCD$?

(A) 6

(B) $6\sqrt{2}$

(C) 9

(D) 18

(E) 24

$A = a^2 = 36 \Rightarrow a = 6$

$x^2 + x^2 = a^2 = 6^2 = 36$

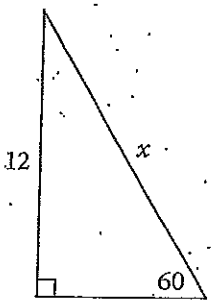
$2x^2 = 36$

$x^2 = 18$

$x = \sqrt{18} = \sqrt{9 \cdot 2} = 3\sqrt{2}$

$A_{ABCD} = x^2 = (3\sqrt{2})^2 = 18$

7.



In the figure above, what is the measure of x?

(A) $6\sqrt{2}$
(B) 12
(C) $8\sqrt{2}$
(D) $8\sqrt{3}$
(E) 14

~~12^2~~ $30°-60°-90°$ triangle

$\frac{1}{2}x$, $\frac{\sqrt{3}}{2}x$, x

12 x

$\frac{\sqrt{3}}{2}x = 12$

$x = 12 \cdot \frac{2}{\sqrt{3}} = \frac{24}{3}\sqrt{3} = 8\sqrt{3}$

9

A cylinder has a volume of 72π cubic inches and a height of 8 inches. If the height is increased by 4 inches, what will be the new volume of the cylinder, in cubic inches?

(A) 576π
(B) 9π
(C) 108π
(D) 328π
(E) 76π

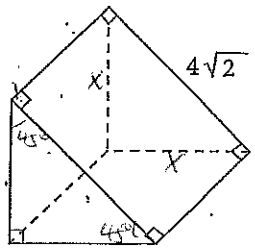
$V = \pi r^2 \cdot h = 72\pi$

$V = \pi r^2 \cdot 8 = 72\pi$

$\Rightarrow r^2 = 9 \Rightarrow r = 3$

$V' = \pi r^2 \cdot h' = \pi \cdot 9 \cdot (8+4)$

$= \pi \cdot 9 \cdot 12 = 108\pi$



If the solid above is half of a cube, then the volume of the solid is

(A) 16
(B) 32
(C) 42
(D) 64
(E) $64\sqrt{2}$

~~$V = \frac{1}{2} V_{cube}$~~

$x^2 + x^2 = (4\sqrt{2})^2 = 32$

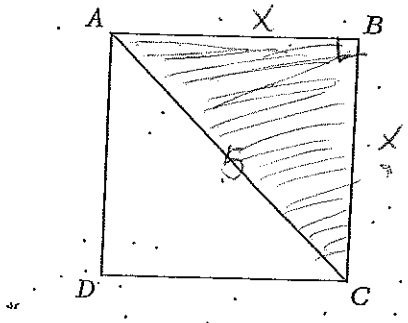
$2x^2 = 32$

$x^2 = 16 \Rightarrow x = 4$

$V = \frac{1}{2} \cdot 4 \cdot 4 \cdot 4 = 32$

10

Triangle Area = $\frac{1}{2}$ · base · height



In square $ABCD$ shown above, if $AC = 5$, what is the area of the shaded region?

$x^2 + x^2 = 5^2$

$2x^2 = 25$

$x^2 = \frac{25}{2} \Rightarrow x = \frac{5}{2}\sqrt{2}$

$A = \frac{1}{2} \cdot x^2 = \frac{1}{2} \cdot \frac{25}{2} = \frac{25}{4}$

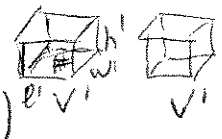
11.

A rectangular block with a volume of 250 cubic inches was sliced into 2 cubes of equal volume. How much greater, in square inches, is the combined surface area of the 2 cubes than the original surface area of the rectangular block?

$V = l \cdot w \cdot h = 250$

~~$S = 2lw + 2(w \cdot h)$~~

$S = 2(lw + lh + wh)$



$S' = 2\left(2(l'w' + l'h' + w'h')\right)$

$= \cancel{4(l'w' + l'h' + w'h')}$

$= 2(2l'w' + 2l'h' + 2w'h')$

$= 2(lw' + lh' + 2w'h') =$

12.

If a right cylinder with a radius of 2 has a volume of 100π, what is the height of the cylinder?

$V = \pi r^2 \cdot h = \pi \cdot 2^2 \cdot h = 100\pi$

$\Rightarrow h = 25$