

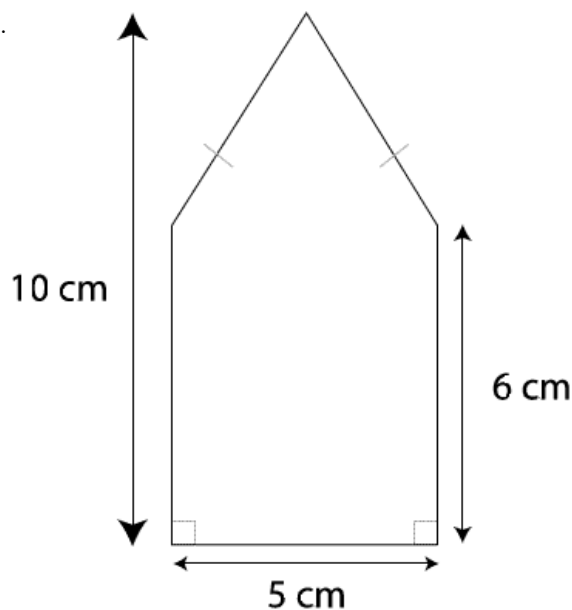
Tutor Doctor

Math 7: Measurement, 10 Questions

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1.



The area of the figure shown above is:

- A) 45 cm^2
- B) 40 cm^2
- C) 50 cm^2
- D) 21 cm^2

Correct. Your answer=B, Correct answer=B

Explanation:

This diagram is composed of two shapes: a rectangle and an isosceles triangle. We know that the triangle is isosceles because the two top sides are of equal length.

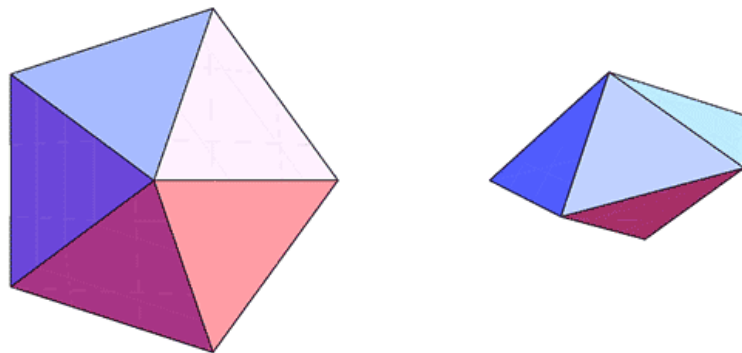
We can add the areas of the two shapes to find the total area of the figure.

1. The rectangle has dimensions of 5×6 (cm),
2. The triangle has a base of 5 cm and a height of 4 cm (the difference between 10 and 6 cm). The area of a triangle is:

$$A_{\text{triangle}} = \frac{1}{2} \text{ base} \times \text{height}$$

$$(5 \times 6) + \left(\frac{1}{2} \times 5 \times 4\right) = 40 \text{ cm}^2$$

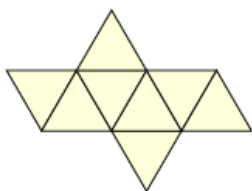
2.



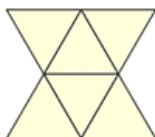
The diagram above shows the top and side views of a three dimensional object whose faces are equilateral triangles.

Which of the following could be a net for this object?

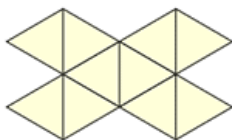
A)



B)



C)



D)



Incorrect. Your answer=D, Correct answer=C

Explanation:

Diagram A will fold up to an object that has 8 faces (the object formed will be an octahedron).

Diagram B will fold up to an object that has 6 faces (the object formed will be a triangular dipyramid).

Diagram C will fold up to an object that has 10 faces (the object formed will be a pentagonal dipyramid). The object we want has 10 faces so C is the answer.

Diagram D will fold up to an object that has 4 faces (the object formed will be a tetrahedron).

3.



The Grade 8 students at a junior high school are building a playground for the local community center. They construct a sandbox with dimensions 2 m by 3 m by 35 cm in the shape of a rectangular prism.

A local supplier has donated sand in $10\,000\text{ cm}^3$ bags.

The number of bags needed to fill the sandbox is

- A) 200
- B) 210
- C) 220
- D) 230

Incorrect. Your answer=A, Correct answer=B

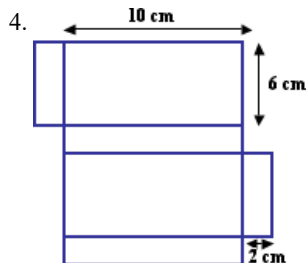
Explanation:

Be careful, the dimensions of the box are given in mixed units. The bags of sand have their volume given in cubic centimeters, so it's easiest to work in centimeters.

There are 100 cm in a meter.

Therefore, the dimensions of the sandbox are 200 cm, 300 cm, and 35 cm, and the volume of the box is $200 \times 300 \times 35 = 2\,100\,000$ cubic centimeters.

Since each bag of sand holds 1000 cubic centimeters, the students need $2\,100\,000 \div 1000 = 210$ bags.



What is the surface area of the rectangular prism created by the net shown in the figure above?

- A) 120 cm^2
- B) 18 cm^2
- C) 92 cm^2
- D) 184 cm^2

Incorrect. Your answer=A, Correct answer=D

Explanation:

The rectangular prism will have 6 faces.

Two of the faces have dimensions of 10×6

Two of the faces have dimensions of 10×2

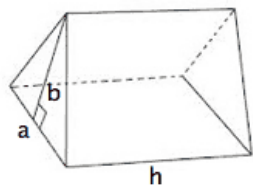
Two of the faces have dimensions of 6×2

So the total surface area is:

$$2(10 \times 6) + 2(10 \times 2) + 2(6 \times 2) = 184$$

The answer is D.

5. Which is the correct formula to determine the volume of a triangular prism?



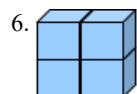
A) $\left(\frac{a \times b}{2}\right) \times h$

B) $2\pi r(r+h)$

C) $(\pi \times r^2) \times h$

D) $\left(\frac{2a+2b}{2}\right) \times h$

Correct. Your answer=A, Correct answer=A



Rita has numerous small cubes that she can arrange to make various shapes, as she has done with the 4 cubes shown in the diagram above. How many more cubes does she need to add to this structure to make the shape of a larger cube?

- A) 2
- B) 4
- C) 8
- D) 16

Incorrect. Your answer=A, Correct answer=B

Explanation:

It's interesting that the word cube has a direct correlation with the shape of a cube...

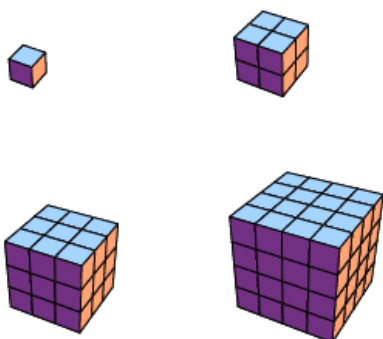
One cube is $1^3 = 1$

The next cube would be made using $2^3 = 8$ cubes

The following cube would be made using $3^3 = 27$ cubes

The next cube up would be made using $4^3 = 64$ cubes

And so on...



Rita needs 8 cubes to make a $2 \times 2 \times 2$ cube, made up of 8 smaller cubes.

She already has 4 cubes in her structure, so she will need 4 more ($8 - 4 = 4$).

The answer is B.

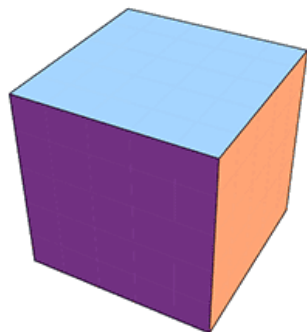
7. A cube with an edge length of 3 cm is divided up into 27 identical cubes.

How much greater is the *combined* surface area of the 27 smaller cubes than the surface area of the original cube?

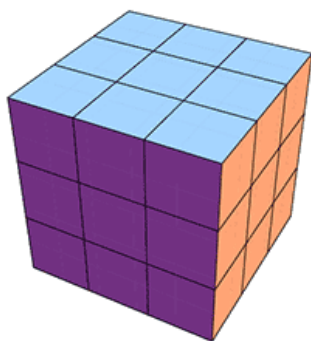
- A) 26 cm^2
- B) 108 cm^2
- C) 162 cm^2
- D) 324 cm^2

Incorrect. Your answer=A, Correct answer=B

Explanation:



The surface of the original cube would be made up of 6 squares, each with an area of $3 \times 3 = 9 \text{ cm}^2$, so $6(3)^2 = 54$ square centimeters.



When a cube of edge length 3 is divided into 27 smaller identical cubes, the edge length of each of the smaller cubes would be 1 cm (as illustrated in the diagram above).

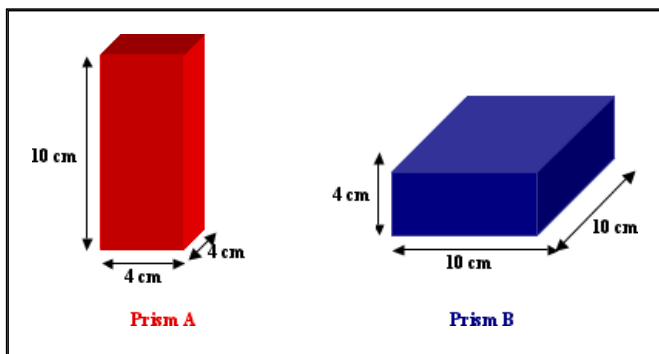
So each face of the smaller cubes would be a square with an area of $1 \times 1 = 1 \text{ cm}^2$

The surface area of one of the smaller cubes would be $6(1)^2 = 6$ square centimeters.

There are 27 small cubes, so their combined surface area is $27(6) = 162$ square centimeters.

The difference is $162 - 54 = 108$ square centimeters.

8.



Which of the following statements about the rectangular prisms shown above is FALSE?

- A) Prism A and Prism B have different volumes
- B) The surface area of the base of Prism A is less than the surface area of the base of Prism B
- C) Prism A and Prism B have the same surface area
- D) The height of Prism A is greater than the height of Prism B

Incorrect. Your answer=A, Correct answer=C

Explanation:

We know that statement A is TRUE. Two of the dimensions of A and B are the same, the fact that the third is different makes it easy to say that the volumes will be different.

Statement D is true, if we take the height to be the "up" measurement just as the diagrams are shown.

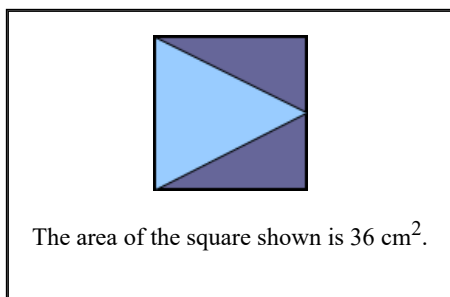
Consider the surface areas:

Prism A has surfaces of 10×4 (front and back), 10×4 (sides), and 4×4 (top and bottom).

Prism B has surfaces of 10×4 (front and back), 10×4 (sides), and 10×10 (top and bottom).

Even without calculating, it is clear that Prism B will have the larger surface area. So statement C is FALSE.

9.



Which of the following statements regarding the diagram above is false?

- A) The area of the triangle is equal to the area of the darkly shaded region
- B) The area of the triangle is equal to the area of the square
- C) The area of the triangle is half the area of the square
- D) The perimeter of the square is 24 cm

Incorrect. Your answer=A, Correct answer=B

Explanation:

If the area of the square is 36 cm^2 , this would have come from squaring the side length, so the side length of the square is 6 cm ($6 \times 6 = 36$)

The base of the triangle is one side of the square (6 cm) and the height of the triangle is equal to the side length of the square (also 6 cm)

The area of a triangle is $A_{\text{triangle}} = \frac{1}{2} \text{ base} \times \text{height}$. In this case, $\frac{1}{2} \times 6 \times 6 = 18$ (square centimeters)

So, answers A and C are true. The total area of the square is 36 square centimeters, and the triangle is half of this.

If the side length of the square is 6 cm, the perimeter is $4 \times 6 = 24$ cm (Answer D is true)

Answer B is the one that is obviously false, and we could have determined that with no calculations at all. The area of the triangle simply CAN NOT be equal to the area of the square, since the triangle is contained within the square with room to spare.

10. Refer to the information in question 9.

What is the area of the region shaded darkest?

- A) 18 cm^2
- B) 36 cm^2
- C) 0 cm^2
- D) not enough information is given to answer this question

Correct. Your answer=A, Correct answer=A

Explanation:

The darkest shaded area will be the difference between the area of the square and the area of the triangle.

If the area of the square is 36 cm^2 , this would have come from squaring the side length, so the side length of the square must be 6 cm ($6 \times 6 = 36$)

The base of the triangle is one side of the square (6 cm) and the height of the triangle is equal to the side length of the square (also 6 cm)

The area of a triangle is $A_{\text{triangle}} = \frac{1}{2} \text{ base} \times \text{height}$

Area of square - Area of triangle = $36 - \frac{1}{2} \times 6 \times 6 = 18$

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