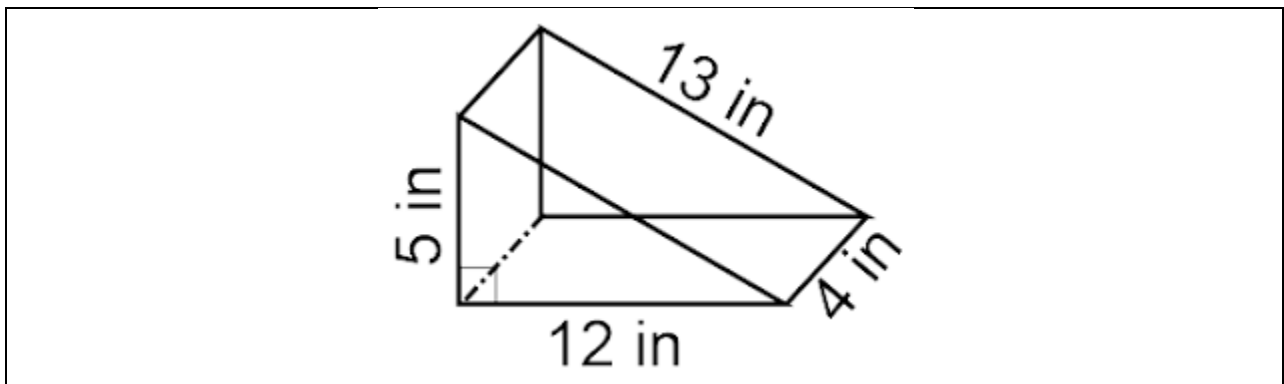## Surface Area of Prisms and Pyramids Practice

1. For a given rectangular prism the length is 14 cm, the width is 6 cm and the height is 5 cm. The surface area of this prism can be determined by
   A) SA = (14)(6)(5)
   B) SA = 2(14) 2(6) 2(5)
   C) SA = 2(14) + 2(6) + 2(5)
   D) SA = 2(14)(6) + 2(14)(5) + 2(6)(5)

Use the following diagram to answer the next question.

13 in

5 in

12 in

4 in

2. The surface area of this triangular prism is
   A) 180 in²   B) 200 in²   C) 220 in²   D) 250 in²

Use the following diagram to answer the next question.
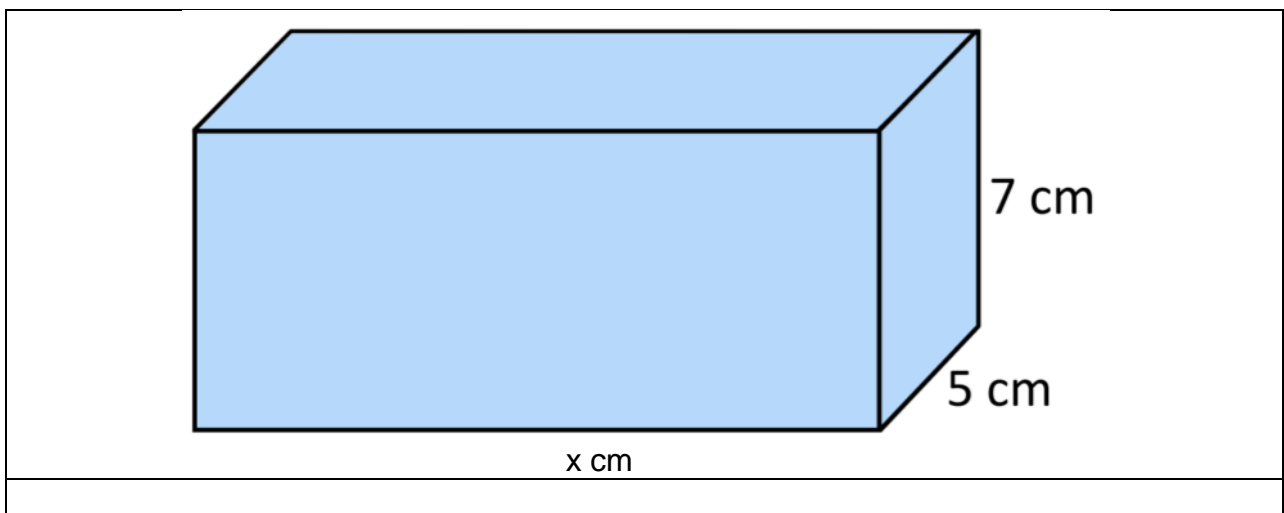
7 cm

5 cm

x cm

3. If the surface area of the prism above is 478 cm², then the value of the missing dimension, x, is _____.

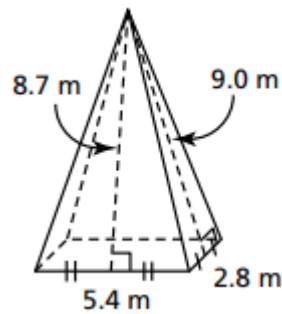4. The surface area of a pyramid with a square base, 13 cm by 13 cm, and a slant height of 21 cm can be calculated by

A) $SA = 13^2 + (13)(21)$

B) $SA = 4\left[\frac{(13)(21)}{2}\right] + 13^2$

C) $SA = 2\left[\frac{(13)(21)}{2}\right] + 13^2$
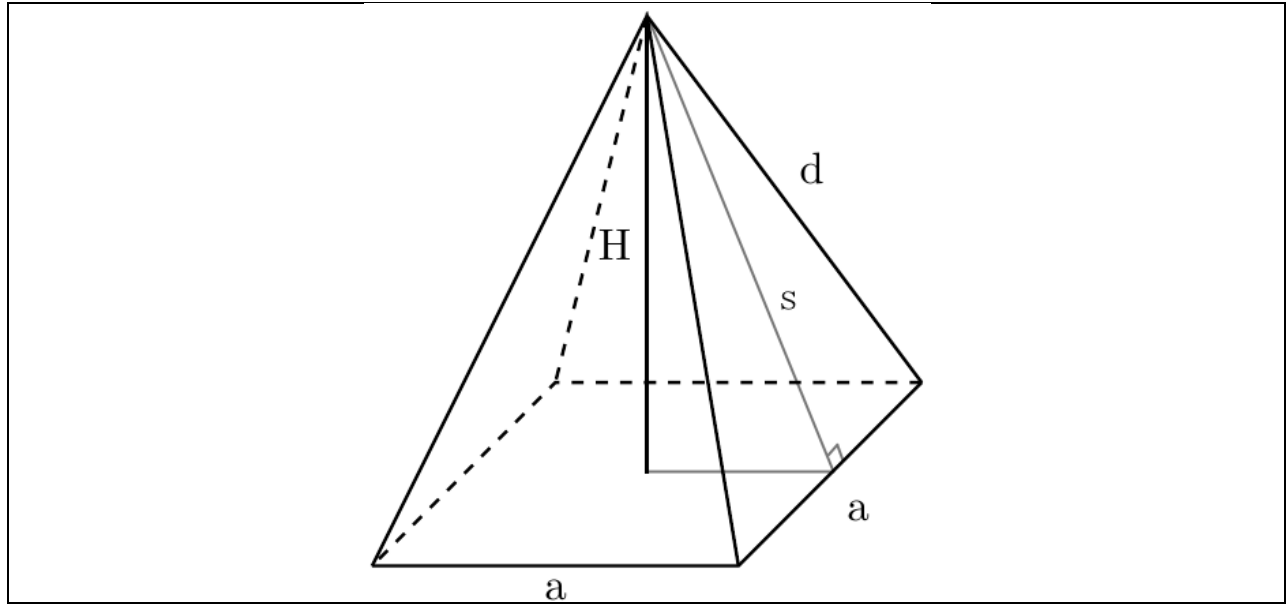
D) $SA = 4\left[\frac{(13)(21)}{2}\right](13^2)$

Use the following diagram to answer the next question.

The base of this pyramid is 5.4 by 2.8. The slant height arising from the side of 5.4 is 8.7. The slant height arising from the side of 2.8 is 9.0.

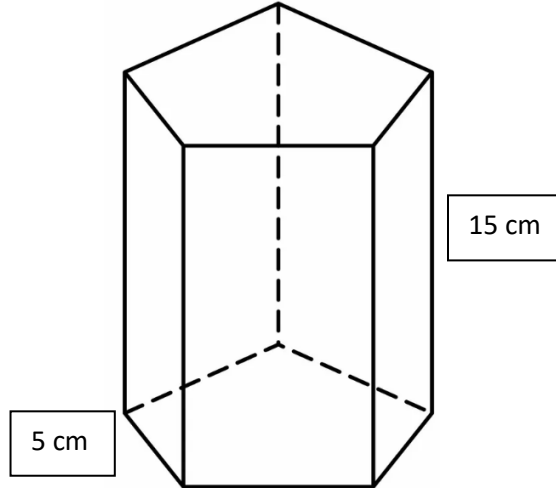5. Sketch and label the 5 sides of this pyramid. Determine the total surface area.

Use the following diagram to answer the next question.

6. The surface area of the square based pyramid above is 297 cm². If a = 9, then the slant height s, is _____ cm.
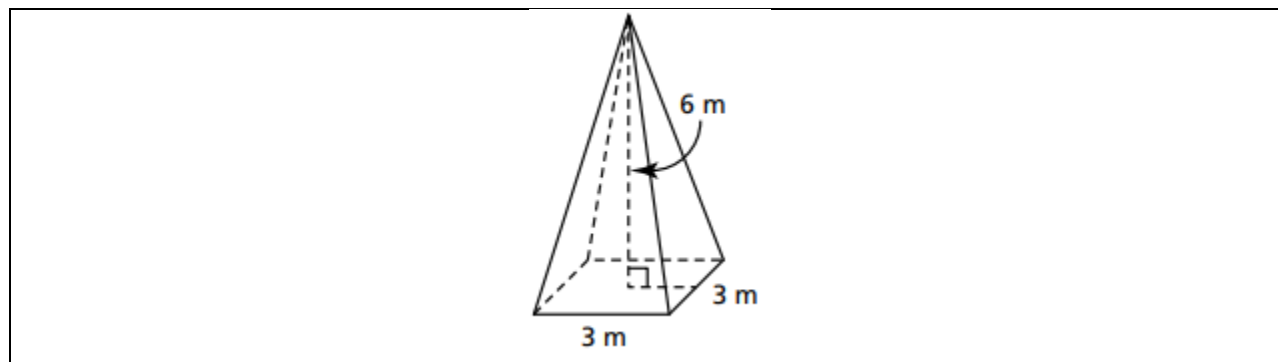
Use the following information to answer the next question.

Consider the regular pentagonal prism below.

15 cm

5 cm

Each side of the pentagonal base is 5 cm. The area of 1 pentagonal base is 125 cm^2 and the height of the prism is 15 cm.

7. The total surface area of the pentagonal prism is
   A) 425 cm^2 B) 500 cm^2 C) 550 cm^2 D) 625 cm^2

Use the following diagram to answer the next question.

8. To the nearest integer, the surface area of the square based pyramid is _____ m².

1. For a given rectangular prism the length is 14 cm, the width is 6 cm and the height is 5 cm. The surface area of this prism can be determined by
   A) SA = (14)(6)(5)
   B) SA = 2(14) 2(6) 2(5)
   C) SA = 2(14) + 2(6) + 2(5)
   D) SA = 2(14)(6) + 2(14)(5) + 2(6)(5)

Solution

A rectangular prism has 3 sets of identical faces.

Edge

Face

Vertex
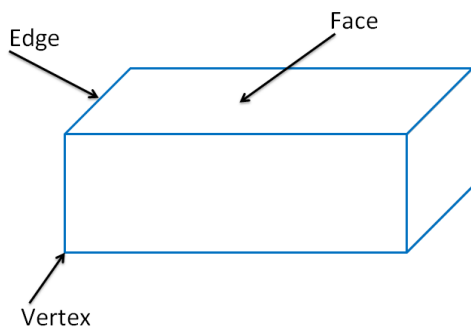
The top and bottom faces are identical.

The left and right faces are identical.

The front and back faces are identical

The 3 dimensions are combined 2 at a time. There are 3 ways to do this. We have to account for the fact that there are 2 identical faces for each combination of 2 dimensions. The areas of all individual faces are added together to arrive at the final total.

Thus, the surface area is SA = 2(14)(6) + 2(14)(5) + 2(6)(5).

The correct answer is D.

Use the following diagram to answer the next question.

13 in

5 in

12 in

4 in
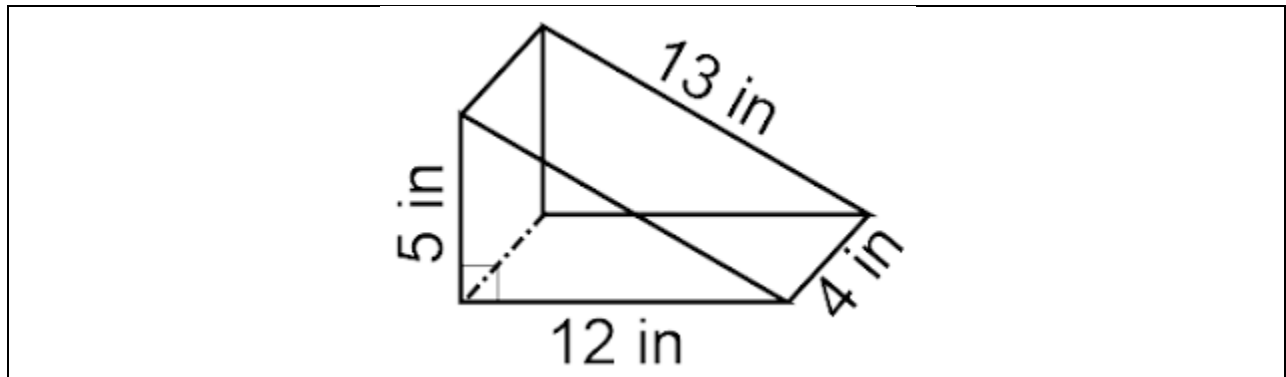
2. The surface area of this triangular prism is
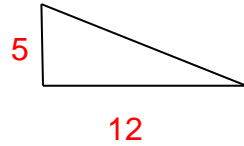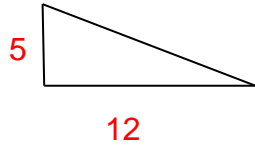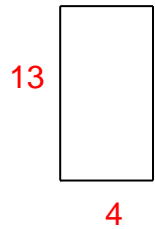A) 180 in²   B) 200 in²   C) 220 in²   D) 250 in²
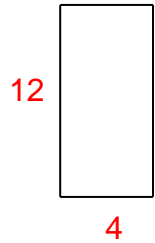
Solution

This is a triangular prism that has 5 sides. Sketch and label the 5 sides, calculate their individual areas, and then sum all the areas.
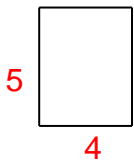
5   5

    12   12

$$A = 2\left[\frac{(5)(12)}{2}\right] = 60 \ in^2$$
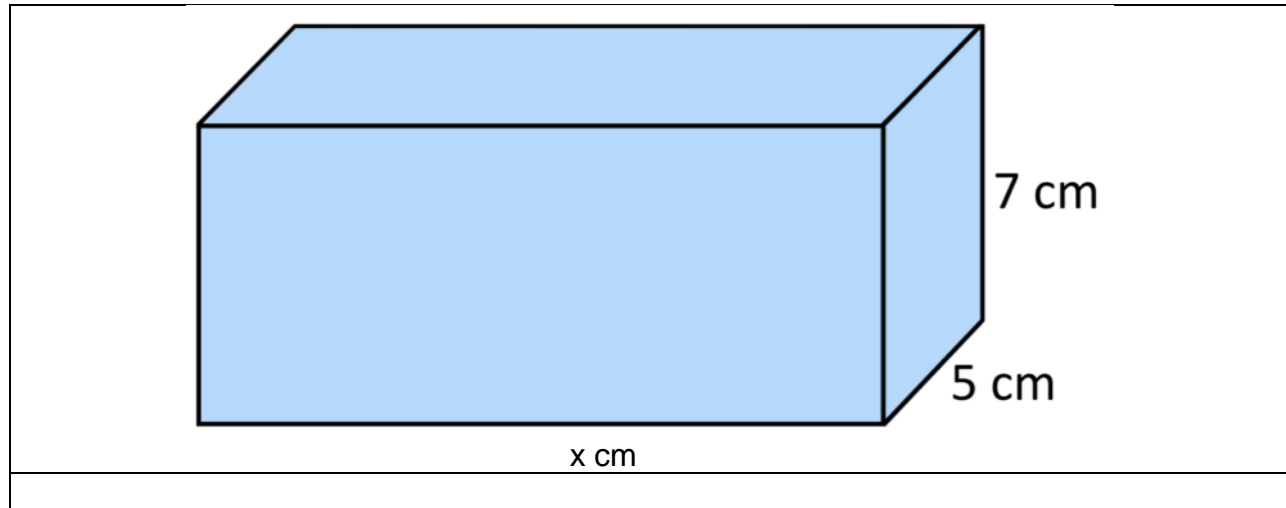
13

A = (13)(4) = 52 in²

4

12

A = (12)(4) = 48 in²

4

5

A = (5)(4) = 20 in²

4

The total surface area is 60 + 52 + 48 + 20 = 180 in².

The correct answer is A.

Use the following diagram to answer the next question.

3. If the surface area of the prism above is 478 cm^2, then the value of the missing dimension, x, is __17__.

Solution

SA = 2(5)(7) + 2(x)(5) + 2(x)(7)

478 = 70 + 10x + 14x
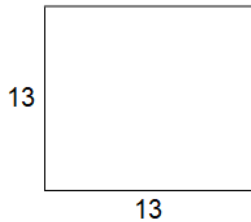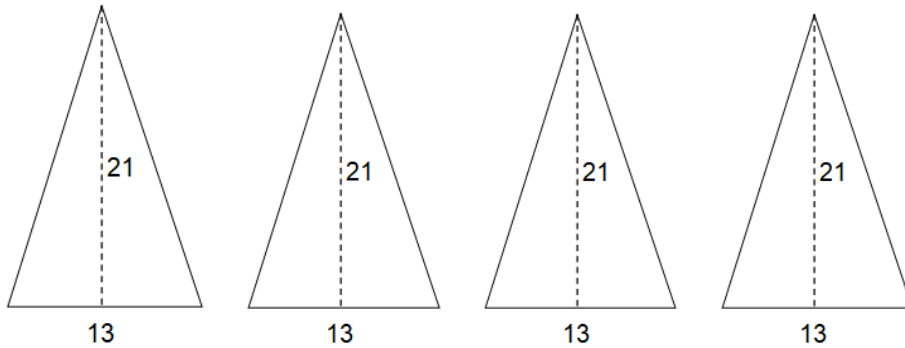
478 = 70 + 24x

408 = 24x

17 = x

The value of the missing dimension is 17 cm.

4. The surface area of a pyramid with a square base, 13 cm by 13 cm, and a slant height of 21 cm can be calculated by
   A) SA = 13^2 + (13)(21)
   B) SA = $4\left[\frac{(13)(21)}{2}\right] + 13^2$
   C) SA = $2\left[\frac{(13)(21)}{2}\right] + 13^2$
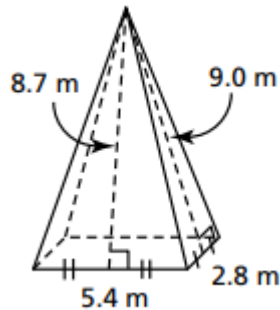   D) SA = $4\left[\frac{(13)(21)}{2}\right](13^2)$

There are 5 sides to the pyramid; a square base and 4 equilateral triangles.

The area of each triangle is $\frac{(b)(h)}{2} = \frac{(13)(21)}{2}$. And since there are 4 triangles, we have $4\left[\frac{(13)(21)}{2}\right]$. Now add this to 13^2.
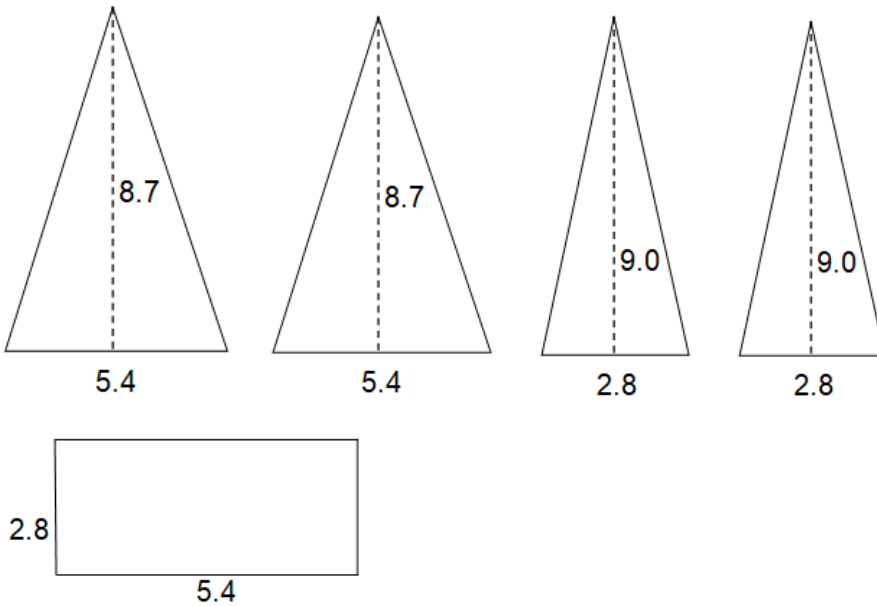
The correct answer is B.

Use the following diagram to answer the next question.

The base of this pyramid is 5.4 by 2.8. The slant height arising from the side of 5.4 is 8.7. The slant height arising from the side of 2.8 is 9.0.

5. Sketch and label the 5 sides of this pyramid. Determine the total surface area.

Solution

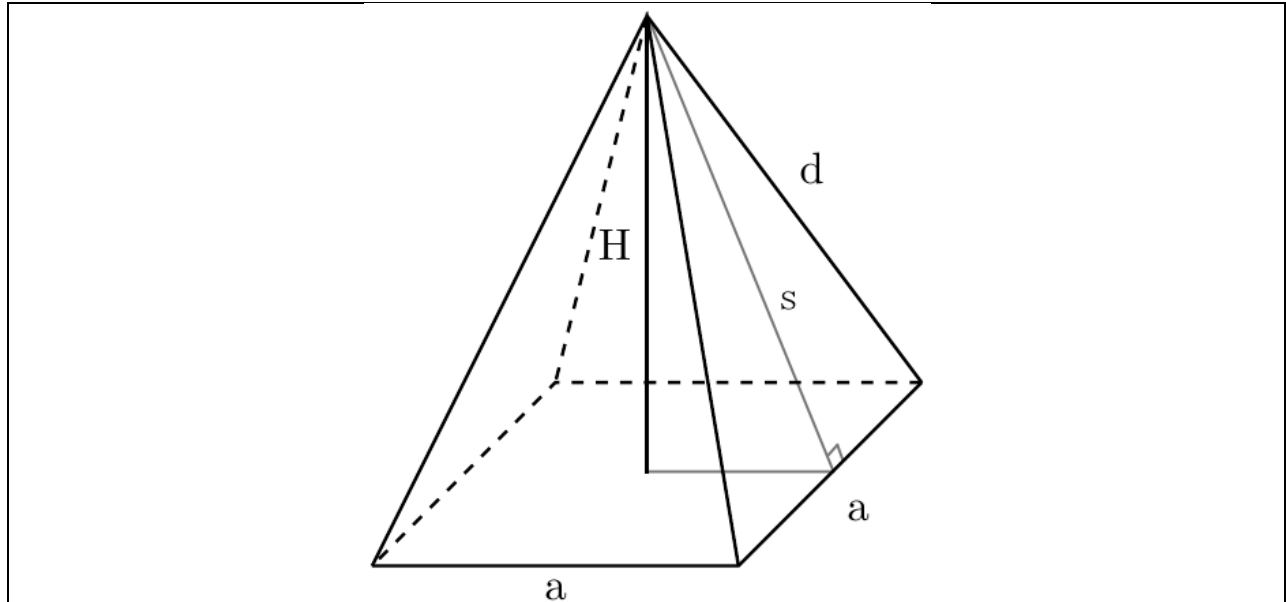The surface area of the 4 triangles is $2\left[\frac{(5.4)(8.7)}{2}\right] + 2\left[\frac{(2.8)(9.0)}{2}\right] = 72.18 \ m^2$.

The surface area of the rectangular base is (2.8)(5.4) = 15.12 m².

The total surface area is 72.18 + 15.12 = 87.3 m².

Use the following diagram to answer the next question.

6. The surface area of the square based pyramid above is 297 cm². If a = 9,
   then the slant height s, is ___12___ cm.

Solution

The surface area of this pyramid is composed of the area of the base, added to the 4
equilateral triangular faces.

$$SA = 9^2 + 4\left[\frac{(9)(s)}{2}\right]$$

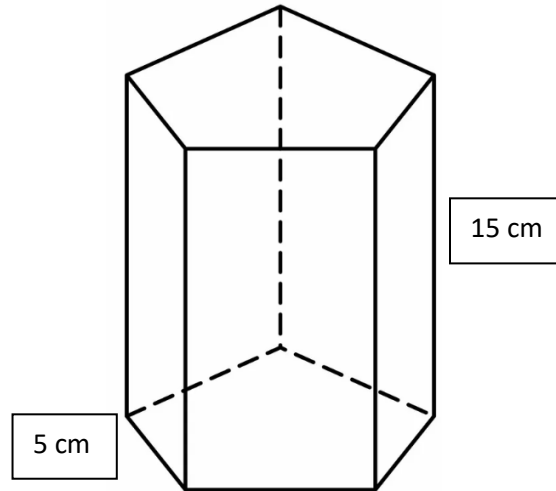$$297 = 9^2 + 4\left[\frac{(9)(s)}{2}\right]$$

297 = 81 + 18s

216 = 18s

12 = s

The slant height, s, is 12 cm.

Use the following information to answer the next question.

Consider the regular pentagonal prism below.

15 cm

5 cm

Each side of the pentagonal base is 5 cm. The area of 1 pentagonal base is 125 cm^2 and the height of the prism is 15 cm.

7. The total surface area of the pentagonal prism is

A) 425 cm^2 B) 500 cm^2 C) 550 cm^2 D) 625 cm^2

Solution

The total surface area is determined by adding the areas of the 2 pentagonal bases to the areas of the 5 rectangular faces.
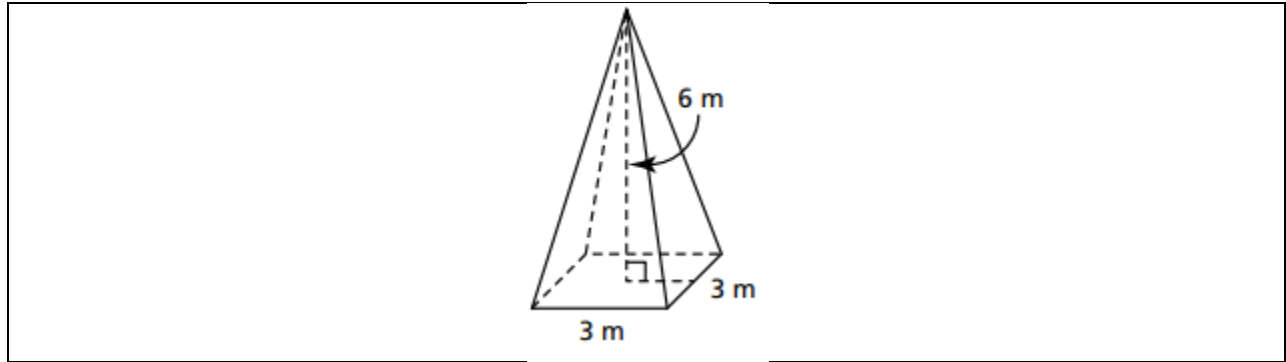
SA = 2(125) + 5[(5)(15)]

SA = 250 + 375

SA = 625 cm^2.

The correct answer is D.

Use the following diagram to answer the next question.

6 m

3 m

3 m

8. To the nearest integer, the surface area of the square based pyramid is _____ m².

Solution

To calculate the surface area, we need the slant height, which we are not given. However, we are given the height (the perpendicular distance from the centre of the base to the highest point of the pyramid).

It is necessary to use Pythagorean Theorem to determine the slant height, which is the hypotenuse in the required triangle. We know 2 of the 3 sides. The height of 6 m is one of the legs and half the base, or 1.5 m, is the other leg.

6

1.5
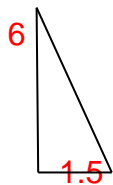
$s^2 = (6)^2 + (1.5)^2$

$s^2 = 36 + 2.25$

$s^2 = 38.25$

$s = 6.1846...$

The surface area of the pyramid is the area of the square base + 4[the area of a triangular face].

$$SA = 3^2 + 4\left[\frac{(3)(6.1846\ldots)}{2}\right]$$

SA = 9 + 37.1079…

SA = 46.1079…

To the nearest integer, the surface area of the square based pyramid is 46 m².