



MATHS

BOOKS - S CHAND IIT JEE

FOUNDATION

**VOLUME AND SURFACE AREA OF A
CUBE AND A CUBOID**

Solved Examples

1. A wax cube of edge 6 cm is melted and formed into three smaller cubes. If the edges of two smaller cubes are 3 cm and 4 cm . What is the edge of the third smaller cube?



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2. The breadth of a room is twice its height and is half of its length. The volume of room is $512dm^3$. Its dimensions are :



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3. The dimensions of a rectangular box are in the ratio $1:2:4$ and the difference between the costs of covering it with the cloth and sheet at the rate of Rs. 20 and Rs. 20.50 per square meters respectively is Rs. 126. Find the dimensions of the box?



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4. 247 Three cubes of side 4 cm each are joined end to end to form a cuboid. The

surface area of the resulting cuboid and total surface area of the three cubes are in the ratio: (B) 7:3 (C) 7:9 (D) 9:7



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5. What is the volume of a cube (in cubic cm) whose diagonal measures $4\sqrt{3}$ cm?



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6. By what percent the volume of a cube increases if the length of each edge was increased by 50%? (a) 50% (b) 125% (c) 237.5% (d) 273.5%



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7. The areas of three adjacent faces of a cuboid are x , y and z . If the volume is V , prove that $V^2 = xyz$.



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8. Find the length of the longest rod that can be placed in a hall of 10 m length , 6 m breadth and 4 m height?



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9. A plot of land in the form of a rectangle has a dimension $240m \times 180m$. A drainlet $10m$ wide is dug all around it (on the outside) and the earth dug out is evenly spread over the

plot, increasing its surface level by 25 cm . Find the depth of the drainlet.



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10. A hall is 15 m long and 12 m broad. If the sum of the areas of the floor and the ceiling is equal to the of the areas of the 4 walls, what is the volume of the hall?



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11. A metal box measures $20\text{cm} \times 12\text{cm} \times 5\text{cm}$. Thickness of the metal is 1 cm. Find the volume of the metal required to make the box.



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12. The cost of preparing the walls of room 12m long at the rate of Rs. 1.35 per square metre is RS. 340.20 and the cost of matting

the floor at 85 paise per square metre is Rs. 91.80. Find the height of the room.



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Question Bank 23

1. A cuboid ($3\text{cm} \times 4\text{cm} \times 5\text{cm}$) is cut into unit cubes. The ratio of the total surface area of all the unit cubes to that of the cuboid is

A. 180:3

B. $180:9$

C. $180:36$

D. $180:47$

Answer: D



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2. The volume of a cube is V . What is the total length of its edges?

A. $6V^{1/3}$

B. $8\sqrt{V}$

C. $12V^{2/3}$

D. $12V^{1/3}$

Answer: D



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3. The volume of a cube is numerically equal to the sum of its edges. What is its total surface area in square units? (a) 36 (b) 66 (c) 72 (d) 183

A. 66

B. 183

C. 36

D. 72

Answer: D



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4. If the surface area of a cube is 216cm^2 , then the length of its diagonal is

A. $6\sqrt{3}cm$

B. $6cm$

C. $8cm$

D. $7\sqrt{3}cm$

Answer: A



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5. If 6 cubes each of 10 cm edge are joined end to end, the surface area of the resulting solid will be

A. 3600cm^2

B. 3000cm^2

C. 2600cm^2

D. 2400cm^2

Answer: C



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6. A closed box made of wood of uniform thickness has length, breadth and height 12 cm, 10 cm and 8 cm respectively. If the

thickness of the wood is 1 cm, the inner surface area is (a) 264 cm² (b) 376 cm² (c) 456 cm² (d) 696 cm²

A. 456cm^2

B. 376cm^2

C. 264cm^2

D. 696cm^2

Answer: B



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7. Three cubes of metal of edges 6 cm, 8 cm and 10 cm are melted to form a new cube. The diagonal of this new cube is

A. 8 cm

B. 12 cm

C. 20.78 cm

D. 21.8 cm

Answer: C



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8. Each edge of a cube is increased by 50%.
Find the percentage increase in the surface area of the cube.

A. 50

B. 125

C. 150

D. 225

Answer: B



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9. A cuboidal water tank contains 216 litres of water. Its depth is $\frac{1}{3}$ of its length and breadth is $\frac{1}{2}$ of $\frac{1}{3}$ of the difference between length and depth. The length of the tank is (a) 2 dm (b) 6 dm (c) 18 dm (d) 72 dm

A. 72 dm

B. 18 dm

C. 6 dm

D. 2 dm

Answer: B



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10. A cistern of capacity 8000 litres measures externally 3.3 m by 2.6 m by 1.1 m and its walls are 5 cm thick. The thickness of the bottom is

(a) 90 cm (b) 1 dm (c) 1 m (d) 1.1 m

A. 1 m

B. 1.1 m

C. 1 dm

D. 90 cm

Answer: C



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11. Water is distributed to a town of 50000 inhabitants from a rectangular reservoir consisting of three equal compartments. Each compartment has a length and breadth 200 m and 100 m respectively, and 12 m depth of water in the beginning. The allowance is 20 litres per head per day. For how many days will the supply of water hold out?

A. 240 days

B. 720 days

C. 800 days

D. 900 days

Answer: B



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12. The length of a room is $\frac{4}{3}$ times its breadth. The total area of the four walls of this room is $\frac{28}{15}$ times the area of the floor of the

room. What is the ratio of the height of the room to the length of the room?

A. 2:3

B. 1:2

C. 2:5

D. 8:15

Answer: D



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13. The height of a room is 'a' and the areas of the two adjacent walls of a room are 'b' and 'c'.

The area of the roof will be

A. $\frac{bc}{a}$

B. bc

C. $\frac{ac}{b^2}$

D. $\frac{bc}{a^2}$

Answer: D



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14. If V be the volume of the cuboid of dimensions a , b and c and S its total surface area, then $\frac{4}{S} \left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c} \right)$ in terms of V is equal to

A. $\frac{8}{V}$

B. $\frac{2}{V}$

C. $\frac{4}{V}$

D. $\frac{1}{V}$

Answer: B



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15. The height of a wall is six times its width and the length of the wall is seven times its height. If volume of the wall be $16128m^3$ its width is

A. 5 m

B. 4 m

C. 4.5 m

D. 6m

Answer: B



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16. A swimming bath is 24 m long and 15 m broad. When a number of men dive into the bath, the height of the water rises by 1 cm. If the average amount of water displaced by one of the men be 0.1 cu. m, how many men are there in the bath? (a) 32 (b) 36 (c) 42 (d) 46

A. 32

B. 36

C. 42

D. 46

Answer: B



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17. A cistern, open at the top, is to be lined with sheet of lead which weighs 27 kg/m^2 . The cistern is 4.5 m long and 3 m wide and holds

50 m³. The weight of lead required is (a) 1660.5 kg (b) 1764.5 kg (c) 1860.5 kg (d) 1864.5 kg

A. 1660.62 kg

B. 1764.60 kg

C. 1864.62 kg

D. 1860.62 kg

Answer: C



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18. How many small cubes, each of 96 cm surface area, can be formed from the material obtained by melting a larger cube of 384 cm surface area? (a) 5 (b) 8 (c) 800 (d) 8000

A. 8

B. 5

C. 800

D. 8000

Answer: A



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19. The length, breadth and height of a cuboid are in the ratio 1:2:3. If they are increased by 100%, 200% and 200% respectively, then compared to the original volume the increase in the volume of the cuboid will be

- A. 5 times
- B. 18 times
- C. 12 times
- D. 17 times

Answer: D



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20. The volume of a cuboid whose sides are in the ratio 1:2:4 is same as that of a cube. What is the ratio of the length of diagonal of the cuboid to that of the cube?

A. $\sqrt{1.25}$

B. $\sqrt{1.75}$

C. $\sqrt{2}$

D. $\sqrt{3.5}$

Answer: B



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21. A cuboid of size $8\text{cm} \times 4\text{cm} \times 2\text{cm}$ is cut into cubes of equal size of 1 cm side. What is the ratio of the surface area of the original cuboid to the surface area of all the unit cubes so formed?

A. 13: 14

B. 8 : 3

C. 7 : 24

D. 7 : 12

Answer: C



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22. The height of a room is 40% of its semi perimeter. It costs 260 to paper the walls of the room with paper 50 cm wide at 2 per

metre allowing an area of 15 m^2 for doors and windows. The height of the room is

A. 2.6 m

B. 3.9 m

C. 4 m

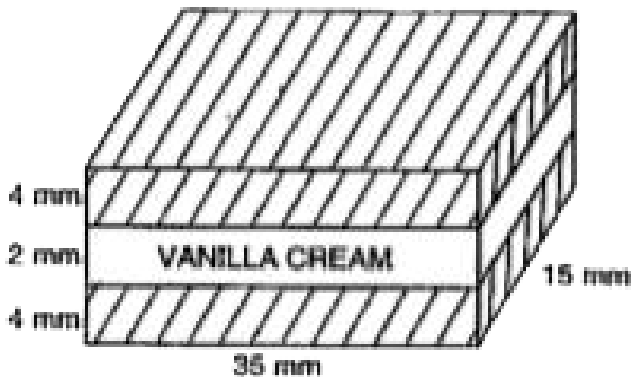
D. 4.2 m

Answer: C



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23. The piece of chocolate biscuit given is filled with a thin layer of vanilla cream. What per cent of the biscuit is vanilla cream? Assume the layer of vanilla cream forms a cuboid.



A. 20 %

B. 25 %

C. 33 %

D. 50 %

Answer: A



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24. 2 cm of rain has fallen on a square kilometer of land. Assuming that 50% of the rain drops could have been collected and contained in a pool having a $100m \times 10m$ base, by what level would the water level in the pool have increased?

A. 15 m

B. 20 m

C. 10 m

D. 25 m

Answer: C



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25. The number of bricks, each measuring $25\text{cm} \times 12.5\text{cm} \times 7.5\text{cm}$, required to construct a wall 6 m long, 5 m high and 0.5 m

thick, while the mortar occupies 5% of the volume of the wall, is (a) 3040 (b) 5740 (c) 6080 (d) 8120

A. 5740

B. 6080

C. 3040

D. 8120

Answer: B



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26. A larger cube is formed from the material obtained by melting three smaller cubes of 3, 4 and 5 cm side. The ratio of the total surface areas of the smaller cubes and the larger cube is (a) 2 : 1 (b) 3 : 2 (c) 25 : 18 (d) 27 : 20

A. 2 : 1

B. 3 : 2

C. 27 : 20

D. 25 : 18

Answer: D



27. The length of a room is double its breadth.

The cost of colouring the ceiling at Rs 25 per

sq. m is Rs 5000 and the cost of painting the

four walls at Rs 240 per sq. m is Rs 64800. Find

the height of the room. (a) 3.5m (b) 4m (c)

4.5m (d) 5m

A. 4.5 m

B. 4 m

C. 3.5 m

D. 5 m

Answer: A



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28. A wooden box (open at the top) of thickness 0.5 cm, length 21 cm, width 11 cm and height 6 cm is painted on the inside. The expenses of painting are Rs. 70. What is the rate of painting per square centimetre?

A. Rs. 0.7

B. Rs. 0.5

C. Rs. 0.1

D. Rs. 0.2

Answer: C



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29. An agricultural field is in the form of a rectangle of length $20m$ and width $14m$. A pit $6m$ long, $3m$ wide and $2.5m$ deep is dug in a corner of the field and the earth taken out of

the pit is spread uniformly over the remaining area of the field. Find the extent to which the level of the field has been raised.

A. 15.16 cm

B. 16.17 cm

C. 17.18 cm

D. 18.19 cm

Answer: C



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30. Water flows into a tank $200m \times 150m$ through a rectangular pipe 1.5×1.25 @ 20kmph. In what time (in minutes) will the water rise by 2 metres?

- A. 76 min
- B. 80 min
- C. 90 min
- D. 96 min

Answer: D



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Self Assessment Sheet 23

1. The volume of a rectangular block of stone is 10368 dm^3 . Its dimensions are in the ratio of 3 : 2 : 1. If its entire surface is polished at 2 paise per dm^2 , then the total cost will be (a) Rs 31.50 (b) Rs 31.68 (c) Rs 63 (d) Rs 63.36

A. Rs. 31.50

B. Rs. 31.68

C. Rs. 63

D. Rs. 63.36

Answer: D



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2. The volume of a cuboid is twice that of a cube. If the dimensions of the cuboid are 9 cm, 8 cm and 6 cm, the total surface area of the cube is (a) 72 cm² (b) 108 cm² (c) 216 cm² (d) 432 cm²

A. 72cm^2

B. 216cm^2

C. 432cm^2

D. 108cm^2

Answer: B



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3. The edges of a cuboid are in the ration 1:2:3 and its surface ara is 88cm^2 . The volume of the cuboid is

A. 120cm^3

B. 64cm^3

C. 48cm^3

D. 24cm^3

Answer: C



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4. A small indoor greenhouse (herbarium) is made entirely of glass panes (including base) held together with tape. It is 30 cm long, 25 cm

wide and 25 cm high.

What is the area of the glass ?

A. 5000cm^2

B. 4800cm^2

C. 4250cm^2

D. 4500cm^2

Answer: C



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5. Two cubes each with 14 cm edge are joined face to face, thus forming a cuboid. What is the surface area of the resulting cuboid ?

A. 3528cm^2

B. 2352cm^2

C. 1960cm^2

D. 1568cm^2

Answer: C



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6. A rectangular room measures $10m \times 10m \times 5m$. What is the maximum length of the stick it can accommodate ?

A. $10m$

B. $15m$

C. $20m$

D. $25m$

Answer: B



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7. A godown measures $40m \times 25m \times 10m$.

Find the maximum number of wooden crates each measuring $1.5m \times 1.25m \times 0.5m$ that can be stored in the godown.

A. 14000

B. 18000

C. 15000

D. 16000

Answer: D



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8. A solid cube of side 12 cm is cut into eight cubes of equal volume. What will be the side of the new cube? Also find the ratio between their surface areas.

A. 6cm , $5:1$

B. 4cm , $4:1$

C. 6cm , $4:1$

D. 5cm , $6:1$

Answer: C



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9. A metallic sheet is of the rectangular shape with dimensions $48\text{cm} \times 36\text{cm}$. From each one of its corners, a square of 8cm is cutoff. An open box is made of the remaining sheet. Find the volume of the box.

A. 5120cm^3

B. 6400cm^3

C. 8960cm^3

D. 2560cm^3

Answer: A



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10. The volume (in m^3) of a cube whose diagonal is 2.5 metre, is :

A. $\frac{125\sqrt{3}}{72}$

B. $\frac{625}{8}$

C. $\frac{125\sqrt{2}}{32}$

D. $\frac{125}{8}$

Answer: A



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Unit Test 5

1. If the longer side of a rectangle is doubled and the other is reduced to half, then the area of the new rectangle goes up by :

A. 50 %

B. 100 %

C. 0 %

D. 150 %

Answer: C



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2. The wheel of a cycle covers 660 metres by making 500 revolutions. What is the diameter of the wheel (in cm)?

A. 42

B. 21

C. 30

D. 60

Answer: A



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3. A village having a population of 4000 requires 150 litres of water per head per day. It has a tank measuring $20m \times 15m \times 6m$.

For how many days will the water of this tank last ?

A. 5 days

B. 3 days

C. 4 days

D. 2 days

Answer: B



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4. In exchange of a square plot one of whose sides is 84m, a man wants to buy a rectangular plot 144 m long and of the same areas of the square plot. Find the width of the rectangular plot.

A. 48 m

B. 50 m

C. 49 m

D. 49.5 m

Answer: C



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5. What will be the perimeter of a rectangle if its length is 3 times its width and the length of the diagonal is $8\sqrt{10}$ cm?

A. $16\sqrt{10}cm$

B. $15\sqrt{10}cm$

C. $64cm$

D. $24\sqrt{10}cm$

Answer: C



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6. The area of a circle drawn with its diameter as the diagonal of a cube of side of length 1 cm each is :

A. $\frac{4\pi}{3}$ sq cm

B. $\frac{3\pi}{2}$ sq cm

C. $\frac{3\pi}{4}$ sq cm

D. $\frac{2\pi}{3}$ sq cm

Answer: C



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7. The perimeter of an equilateral triangle and

a square are same, then $\frac{\text{area of } \triangle}{\text{area of } \square} =$

A. $\frac{4}{3}$

B. 1

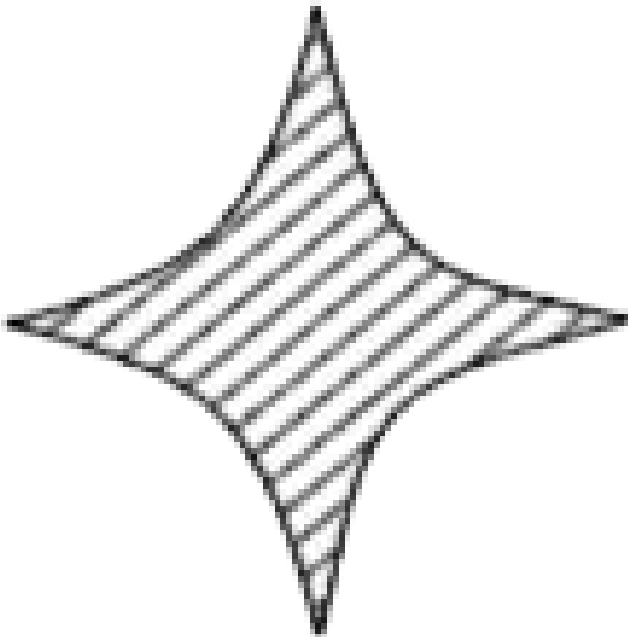
C. 1.5

D. > 1

Answer: D



8. The quadrants shown in the figure .given here are each of diameter 12 cm. What is the area of the shaded portion ?



A. $12(12 - \pi) \text{ cm}^2$

B. $144(4 - \pi) \text{ cm}^2$

C. $36\pi \text{ cm}^2$

D. $36(4 - \pi) \text{ cm}^2$

Answer: D



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9. A plastic box 1.5 m long, 1.25 m wide and 65 cm deep is to be made. It is opened at the top. Ignoring the thickness of the plastic sheet, determine :

The cost of sheet for it, if a sheet measuring $1m^2$ costs Rs 20.

A. Rs.100

B. Rs. 109

C. Rs.115

D. Rs.110

Answer: B



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10. A wooden box measures 20 cm by 10 cm by 9 cm. Thickness of wood is 1 cm. Volume of wood to make the box (in cubic cm) is :

A. 792

B. 519

C. 2400

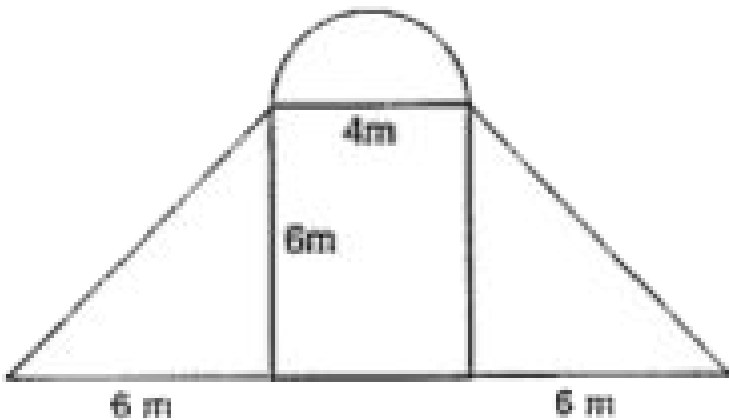
D. 1120

Answer: A



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11. Front side wall of a house consists of a rectangle of $6m \times 4m$ surrounded by a semicircle with base $4m$. It has two isosceles triangles made with vertical sides of the rectangle. The net area of the wall in sq m is:



A. $4\left(15 + \frac{\pi}{2}\right)$

B. $4(18 + \pi)$

C. $4(24 + \pi)$

D. $64 + 4\pi$

Answer: A



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12. If the sum of diagonals of a rhombus is 10 cm and its area is 12cm^2 , then the lengths of its diagonals are :

A. 5,5

B. 9,1

C. 8,2

D. 6,4

Answer: D



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13. Four equal sized maximum circular plates are cut off from a square paper sheet of area 784 cm^2 . The circumference of each plate is (a) 22 cm (b) 44 cm (c) 66 cm (d) 88 cm

A. 22 cm

B. 44 cm

C. 66 cm

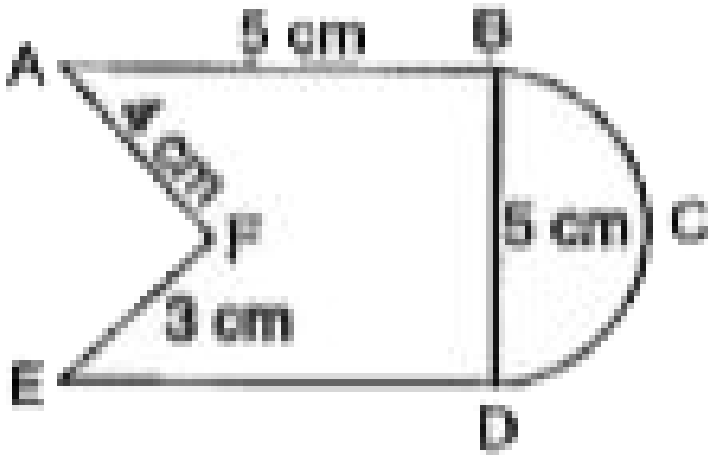
D. 88 cm

Answer: B



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14. The area of the given figure ABCDEF is :



A. $22.82cm^2$

B. $25.82cm^2$

C. $26.82cm^2$

D. $28.82cm^2$

Answer: D



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15. The volume of a cube of 60 cm side is the same as that of a cuboid one of whose sides is 36 cm. If the ratio of the other two sides is 15:16, then the largest side of the cuboid is :

A. 60 cm

B. 75 cm

C. 80 cm

D. 90 cm

Answer: C



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16. The area of a square and a rectangular field is equal and is $900m^2$. If the perimeter of the rectangular field is 2 m more than that of the square field, calculate the dimensions of the rectangular field.

A. 24 m, 10 m

B. 30 m, 25 m

C. 36 m, 25 m

D. 36 m, 24 m

Answer: C



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17. The sum of length, breadth and height of a cuboid is 12 cm long and its diagonal is 8 cm.

The total surface area of the cuboid is :

A. 88 sq cm

B. 85 sq cm

C. 90 sq cm

D. 80 sq cm

Answer: D



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18. The sum of length, breadth and height of a room is 19 m. The length of the diagonal is 11

m. The cost of painting the total surface area of the room at the rate of Rs. 10 per m^2 is

A. Rs. 240

B. Rs. 2400

C. Rs. 430

D. Rs. 4200

Answer: B



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19. Three cubes of metal whose edges are in the ratio 3:4:5 are melted down into a single cube whose diagonal is $12\sqrt{3} \text{ cm}$. Find the edges of three cubes.

A. 6 cm, 8 cm, 10 cm

B. 3 cm, 4 cm, 5 cm

C. 9 cm, 12 cm, 15 cm

D. None of these

Answer: A



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20. ABCD is a parallelogram with sides $AB = 12$ cm, $BC = 10$ cm and diagonal $AC = 16$ cm. The area of the parallelogram and the distance between the shorter sides are respectively.

- A. 120.5cm^2 , 12.05cm
- B. 119.8cm^2 , 11.98cm
- C. 118.71cm^2 , 11.87cm
- D. 117.9cm^2 , 11.79cm

Answer: B



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