Useful Knowledge and Formulas

Chapter 4   Percentages (I)

1.   Percentage change $= \dfrac{\text{New value} - \text{Original value}}{\text{Original value}} \times 100\%$

2.   (a)   New value = Original value × (1 + Percentage increase)

     (b)   New value = Original value × (1 − Percentage decrease)

3.   Profit and loss

$$\text{Percentage change} = \frac{\text{Selling price} - \text{Cost price}}{\text{Cost price}} \times 100\%$$

     If the percentage change > 0, then there is a profit.

     If the percentage change < 0, then there is a loss.

4.   Selling price = Cost price × (1 + Profit percentage)
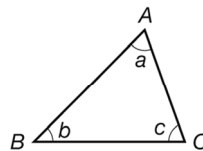
                        or

           = Cost price × (1 − Loss percentage)

5.   Discount percentage $= \dfrac{\text{Marked price} - \text{Selling price}}{\text{Marked price}} \times 100\%$

6.   Selling price = Marked price × (1 − Discount percentage)

Chapter 6   Introduction to Geometry

In $\triangle ABC$, $a + b + c = 180°$.

(Reference: $\angle$ *sum of* $\triangle$)

Chapter 8   Areas and Volumes (I)

1.   Volume of a prism = Base area × Height

2.   Total surface area of a prism = Areas of all lateral faces + Base area × 2

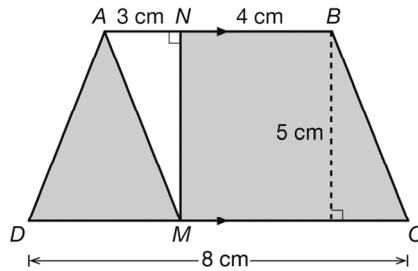**Chapter 9   Congruence and Similarity**

1.   If $\triangle ABC \cong \triangle XYZ$, then

     (a) $AB = XY$, $BC = YZ$ and $AC = XZ$,

     (b) $\angle ABC = \angle XYZ$, $\angle ACB = \angle XZY$ and $\angle BAC = \angle YXZ$.

Chapter 8

Areas and Volumes (I)

★ Warm Up Zone ★

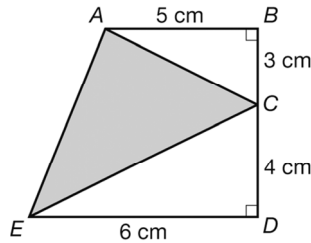1. Find the area of the shaded region in the following figure.

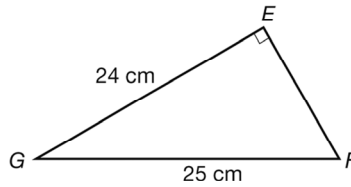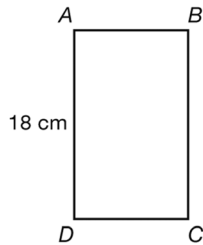2. Find the area of the shaded region in the following figure.

≡★Elite Zone★≡

Level Up Questions

1. In the figure, rectangle $ABCD$ and $\triangle EFG$ have the same perimeter. Suppose the area of rectangle $ABCD$ is 180 cm^2 and $AD = 18$ cm. Find the area of $\triangle EFG$.

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A         B

18 cm

D         C
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            E
   24 cm
G
      25 cm     F
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2. The area of $\triangle ABC$ is 96 cm^2 and its base length is 24 cm. Find the area of $\triangle DEF$ if its base length and height are triple those of $\triangle ABC$.

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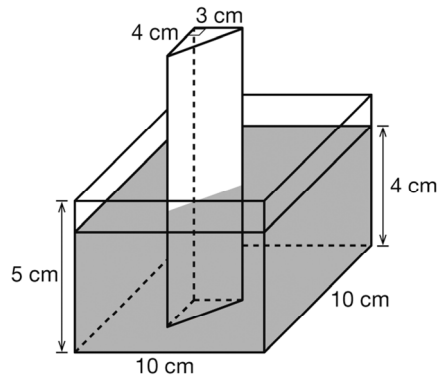
17. The figure shows a rectangular tank with height 5 cm. It base is a square with side length 10 cm. A triangular prism is put into the tank. Then some water is poured into the tank until the depth of water is 4 cm. Find the volume of water held by this tank.

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Cross-topics

18. The length and the breadth of a cuboid tank are each increased by 50% and the height is decreased by 25%. Find the percentage change in volume.

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19. A cuboid with a square base has a height of 32 cm and volume of 1152 cm³. Find the total surface area of the cuboid.
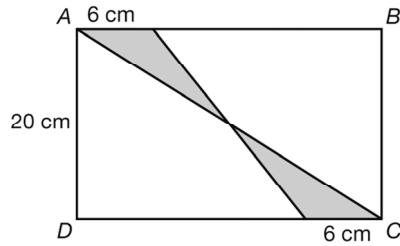
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Special Scenario

21. *ABCD* is a rectangle. Find the total area of the shaded region in the following figures.
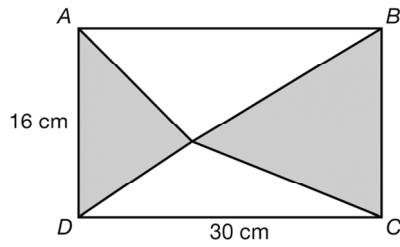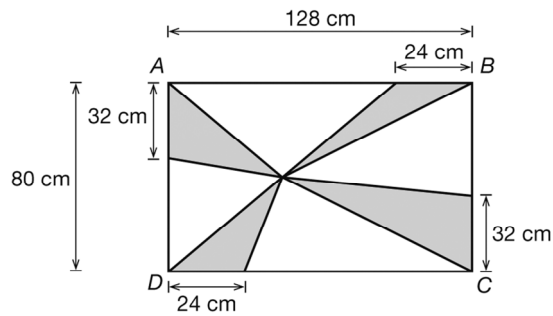
(a)

(b)

(c)

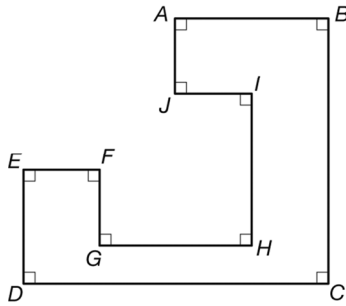29. In the figure, $BC = 15$ cm, $CD = 20$ cm, $FG = 6$ cm and $JI = 4$ cm. Find the perimeter of the figure.
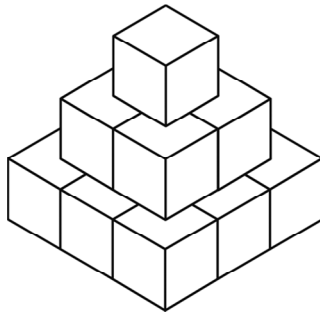

30. A new solid formed by a number of cubes is shown in the figure. Suppose the length of a cube is 3 cm.

First Row = 1 cube
Second Row = 4 cubes
Third Row = 9 cubes
⋮

(a) Find the total surface area of the solid with 3 rows.

(b)   When some cubes are added (i.e. 4th row $= 16$, 5th row $= 25 \cdots \cdots$) at the bottom of the previous row, find the total surface area of the solid with 15 rows.