10 Perimeter and area
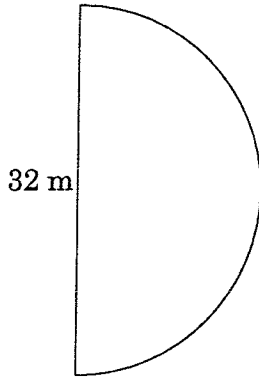
Question 1   Find the perimeter of each of the following figures:
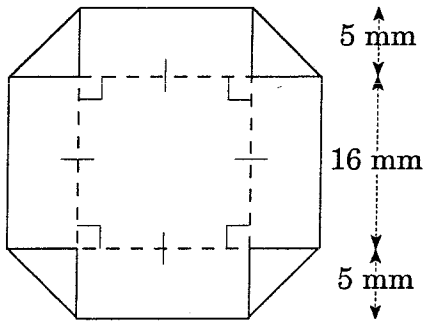
(a)

32 m

P = _____

_____

_____

(b)

15 cm

60°

P = _____

_____

_____

(c)

5 mm

16 mm

5 mm
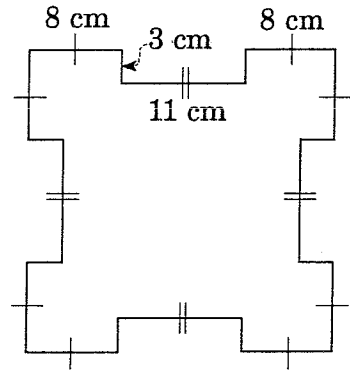
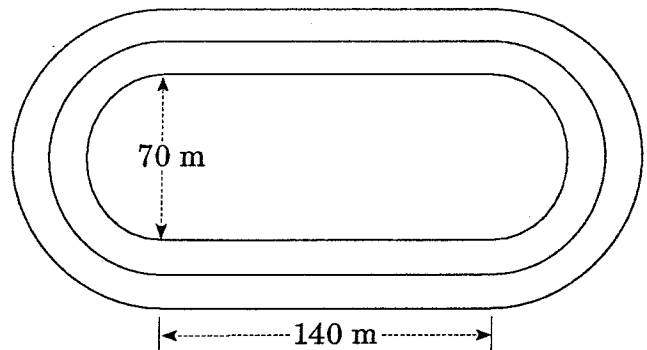P = _____

_____

_____

(d)

8 cm   3 cm   8 cm

11 cm
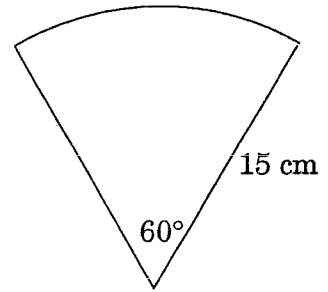
P = _____

_____

_____

Question 2

(a)   An athlete runs along the inside track of the field.

How far does he run if he does three laps?

_____

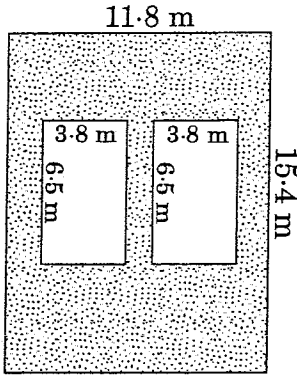_____

_____

70 m

|←------------140 m------------→|

(b)   A second athlete runs in the next lane, 1 m further out. How far ahead must the second athlete start in order to run the same distance as the first athlete if they run only one lap?

_____

_____

Question 3   Calculate the shaded area of each of the following figures:

(a)

11·8 m

3·8 m   3·8 m

6·5 m   6·5 m

15·4 m

$A =$ _____

_____

_____

(b)

13 m

6 m

10 m

19 m

$A =$ _____

_____

_____

(c)

7 cm

16 cm

$A =$ _____

_____

_____

_____

(d)

12 cm

13 cm

$A =$ _____

_____

_____

_____

(e)

24 cm

30 cm

$A =$ _____

_____

_____

(f)

4 cm

8 cm   8 cm
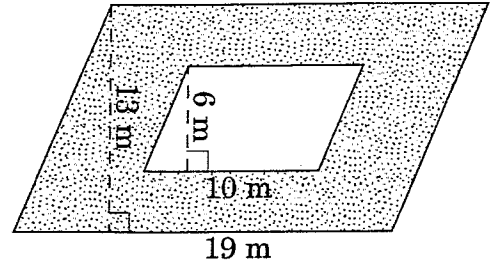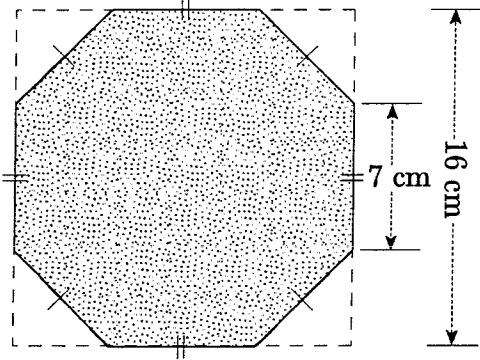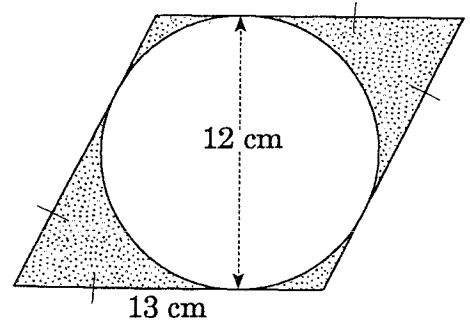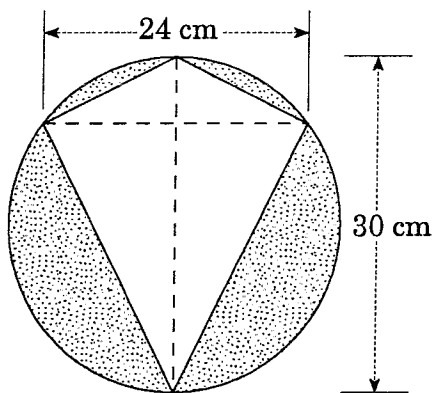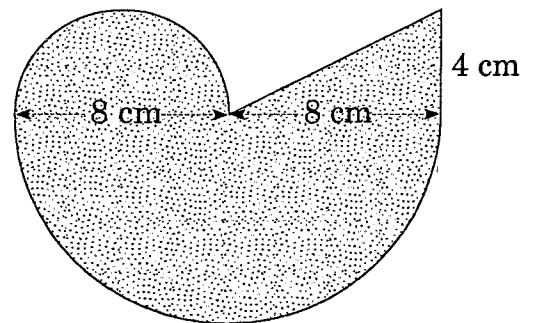
$A =$ _____

_____

_____
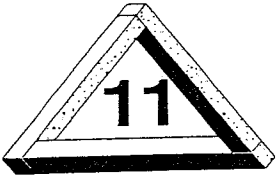
Volume and surface area

Question 1 Calculate the volume and the surface area of each of the following solids:

(a)

11 cm

8 cm   15 cm

V = _____

SA = _____

(b)

12·6 m

5 m

17·2 m

5·5 m

11·4 m

V = _____

SA = _____

(c)

25 m

30 m

40 m

60 m   11 m

V = _____

SA = _____

(d)

3 m

5 m

V = _____

SA = _____

(e)

16 m

20 m

8 m

38 m

V = _____

SA = _____

(f)

16 cm

10 cm

22 cm

5 cm

V = _____

SA = _____

(g)

30 m

8 m

20 m

10 m

$V =$ _____

_____

$SA =$ _____

_____

_____

(h)

5 m

18 m

12 m

28 m

33 m

$V =$ _____

_____

_____

$SA =$ _____

_____

_____

_____
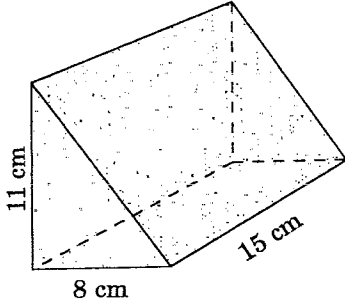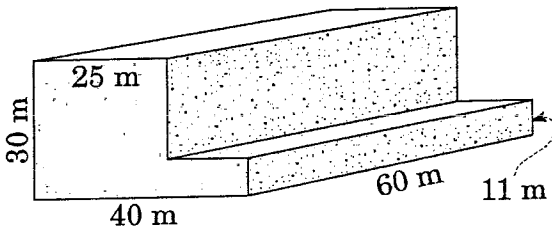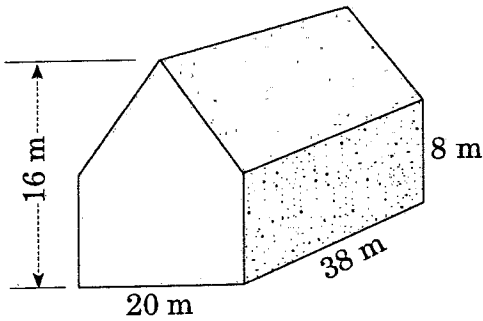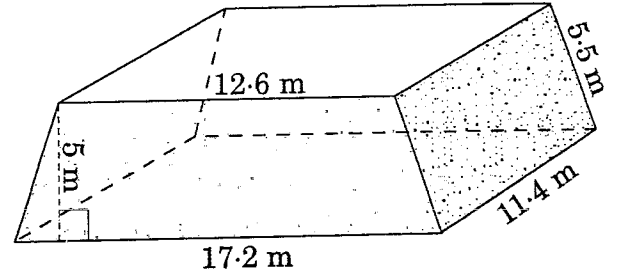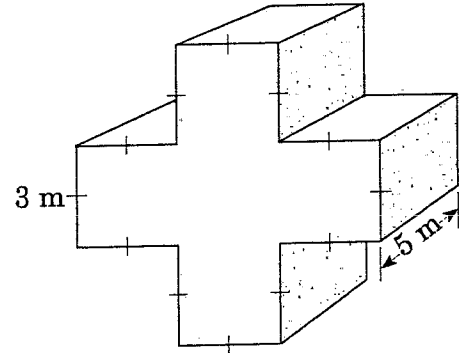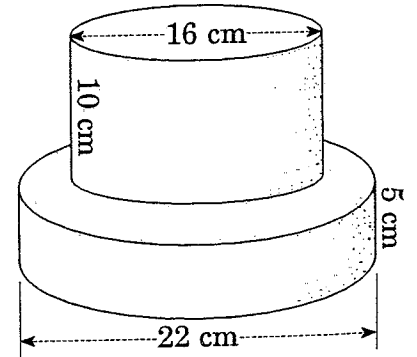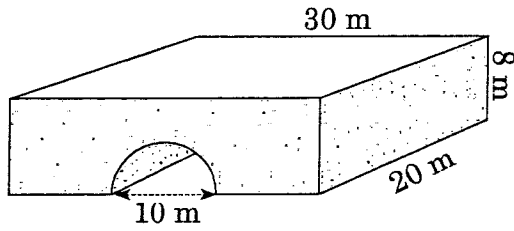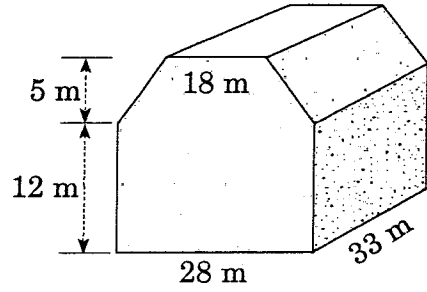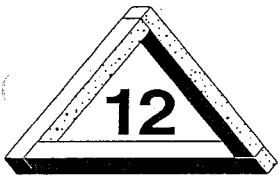
12 Solving problems with equations

By first setting up an equation, solve each of the following problems:

1 The sum of three consecutive integers is 471.
Find the middle one.

_____

_____

_____

_____

_____

2 In a class of 36 students there are 12 more
girls than boys. How many girls are there?

_____

_____

_____

_____

3 A triangle has a perimeter of 47 cm. If one
side is 9 cm longer than the second side, and
the third side is 4 cm shorter than the second
side, find the length of the second side.

_____

_____

_____

_____

4 The length of a rectangle is 5 more than
twice the width. Find its dimensions if the
perimeter is 64 cm.

_____

_____

_____

_____

_____

_____

5 In a yacht race the second leg is twice as long
as the first, while the third leg is 10 km longer
than the second.

Find the length of the second leg if the race is
run over a distance of 15 km.

_____

_____

_____

_____

_____

_____

_____

_____

13 Area and volume: problems

Sketch a diagram to help solve these problems:

1   The cross-section of a steel pipe is an annulus with inner and outer radii of 10·5 cm and 14 cm respectively.

Find the volume of metal in a length of 10 metres of pipe.

_____

_____

2   A car's engine has 4 cylinders, each of diameter 7·8 cm and height 8·4 cm.

Find the capacity of the engine in cc.

_____

_____

_____

_____

3   A swimming pool has a length of 50 m and width 30 m. At the shallow end the water is 0·9 m deep and at the other end it is 2·3 m deep.

Find the volume in cubic metres and hence the capacity in litres.

_____

_____

4   A closed cube has a volume of 216 m³. Find the length of each side, and hence the surface area.

_____

_____

_____

_____

5   A rectangular prism has its surface area equal to 184 cm². If its length and breadth are respectively 8 cm and 4 cm, find its height.

_____

_____

_____

_____

6   A cylinder has a volume of 462 cm³. Find:

(a) the height if its radius is 3·5 cm

_____

_____

(b) the radius if the height is 3 cm.

_____

_____

The curved surface area of a cylinder is 264 cm^2. Find the height if the radius is 14 cm.

_____

_____

_____

A car's engine has 6 cylinders, with a total capacity of 3000 cc.

(a) If the diameter of each cylinder is 8·2 cm, find the height of each cylinder.

_____

_____

_____

(b) If the height of each cylinder is 12 cm, find the radius of each cylinder.

_____

_____

_____

9   A square sheet of metal of side 12 cm has a square piece cut out from each corner. The remaining piece is folded to form a cube with an open top.

(a) Find the area cut off.

_____

_____

(b) Find the volume of the cube.

_____

_____

10   A rectangular prism 4 m long by 3 m wide by 1 m high is half filled with water. The water is drained into a cylindrical tank of diameter 2·4 m. To what height will the water rise in the tank?

_____

_____

_____

_____

14 Indices

Question 1   Simplify the following:

(a) $n^4 \times n =$

(b) $y^3 \times y \times y^6 =$

(c) $n^6 \div n =$

(d) $p^3 \times p^7 \div p^4 =$

(e) $\dfrac{m^6}{m^5} =$

(f) $\left(a^3 \right)^4 =$

(g) $7n^5 \times 5n^7 =$

(h) $x^4 y^2 \times x^5 y^3 =$

(i) $4x^{10} y^6 \div 2x^5 y^3 =$

9 Equations

1 (a) $m = 7$ (b) $a = -26$ (c) $x = 4$
  (d) $y = -2$ (e) $p = -3\frac{1}{2}$ (f) $b = -13$

2 (a) $y = 5\frac{4}{7}$ (b) $x = 1\frac{3}{5}$ (c) $a = -4\frac{3}{4}$
  (d) $y = -\frac{3}{5}$ (e) $m = 9\frac{2}{5}$ (f) $r = -3$

3 (a) $a = 3$ (b) $x = -1\frac{1}{5}$ (c) $m = 4\frac{1}{2}$
  (d) $r = -4$ (e) $x = -2\frac{1}{2}$ (f) $y = 2$

4 (a) $x = 3\frac{1}{3}$ (b) $p = -2\frac{3}{4}$ (c) $m = 1\frac{5}{8}$
  (d) $x = 3\frac{3}{5}$ (e) $q = 30$ (f) $n = 15\frac{3}{4}$

5 (a) $p = 32$ (b) $n = 3$ (c) $d = -5\frac{4}{5}$
  (d) $q = 14\frac{1}{2}$ (e) $x = 11$ or $x = -1$
  (f) $x = 22$

6 (a) $S = 90$ (b) $v = 15.52$ (c) $V = 401.92$
  (d) $C = 35$ (e) $V = 2662.95$ (f) $S = 1440$
  (g) $x = -1$ or $-\frac{2}{3}$ (h) $R = 1.5$

10 Perimeter and area

Answers may vary slightly, depending on the value of π used.

1 (a) 82.27 m (b) 45.71 cm
  (c) 92.28 mm (d) 132 cm

2 (a) 499.91 m (b) 6.28 m

3 (a) 132.32 m^2 (b) 187 m^2 (c) 215.5 cm^2
  (d) 42.9 cm^2 (e) 346.86 cm^2 (f) 141.66 cm^2

11 Volume and surface area

1 (a) $V = 660$ cm^3 (b) $V = 849.3$ m^3
     $SA = 577.02$ cm^2 $SA = 614.12$ m^2
  (c) $V = 54\,900$ m^3 (d) $V = 225$ m^3
     $SA = 10\,230$ m^2 $SA = 270$ m^2
  (e) $V = 9120$ m^3 (f) $V = 3911.3$ cm^3
     $SA = 2821.27$ m^2 $SA = 1608.5$ cm^2
  (g) $V = 4014.6$ m^3 (h) $V = 14\,883$ m^3
     $SA = 2035.5$ m^2 $SA = 2886.69$ m^2

12 Solving problems with equations

1 157
2 24 girls
3 14 cm
4 9 cm by 23 cm
5 2 km

13 Area and volume: problems

1 $269\,391.57$ cm^3
2 1605.5 cc
3 2400 m^3; $2\,400\,000$ litres
4 length 6 m; surface area 216 m^2
5 5 cm
6 (a) 12 cm (b) 7 cm
7 6 cm 3cm
8 (a) 9.5 cm (b) 3.6 cm
9 (a) 64 cm^2 (b) 64 cm^3
10 1.3 m

14 Indices

1 (a) n^5 (b) y^{10} (c) n^5
  (d) p^6 (e) m (f) a^{12}
  (g) $35n^{12}$ (h) $x^9 y^5$ (i) $2x^5 y$
  (j) $1024 p^5 q^{15}$ (k) $8m^3$ (l) $36x^{1\cdot}$

2 (a) $121 x^{14} y^6 z^{24}$ (b) a^2 (c) x^{10}
  (d) m^7 (e) $9m^4 p^6$ (f) $2x^4 y$
  (g) $p^7 q^5$ (h) $4m^3 n^6$ (i) $10 x^5$

3 (a) 3^{2x} (b) 5^{x+11} (c) 5^{2m+}
  (d) 3^{x-y} (e) 2^{3n-1} (f) a^{m+3}
  (g) $\frac{m^3 n^2}{4}$ (h) $\frac{3(a+b)^3}{x^6}$ (i) $\frac{m^5 (}{n^2 (m^4}$

4 (a) $\frac{1}{a^2}$ (b) x^4 (c) $\frac{1}{n^{15}}$
  (d) $\frac{p^{12}}{8}$ (e) $\frac{3}{x^9}$ (f) $\frac{15}{ab^4}$

5 (a) 2 (b) 4 (c) 100
  (d) 625 (e) 27 (f) 0.2
  (g) 0.1 (h) 8 (i) 0.17

6 (a) p^4 (b) $m^{1/2}$ (c) $4n^{3/2}$
  (d) $4p^2$ (e) $m^{-7/6}$ (f) a^2
  (g) $4n^2$ (h) $m^3 n^2$ (i) $4a^8 b^1$

7 (a) 5 (b) 3 (c) 0.1 or
  (d) 0.06 or $\frac{1}{16}$ (e) 9 (f) 0.13 c
  (g) 5 (h) 0.36 (i) 0.1 or
  (j) 0.59 or $\frac{8}{27}$ (k) 6.06 or $\frac{81}{16}$ (l) 0.2 or

8 (a) $a^5 + 2a^2$ (b) $x^4 - 5x^2$
  (c) $n^5 + 3n^3$ (d) $10p^7 - 15p^4$
  (e) $2x^5 - 3x^2 y^2$ (f) $35m^3 n + 14mn^2$
  (g) $a^6 - 1$ (h) $x^4 + 2x^2 - 3$
  (i) $6m^4 + 13n^2 - 5n^4$