CHAPTER 4
Surface area and volume
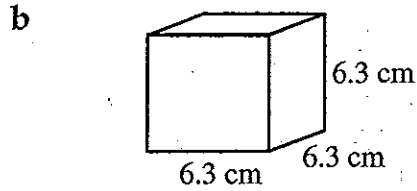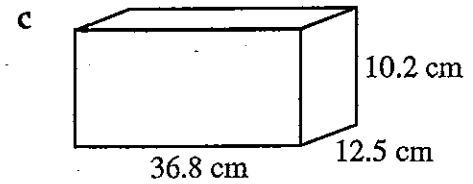
UNIT 1: Surface area of different solids
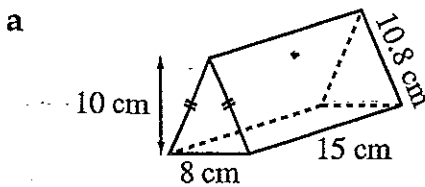
QUESTION 1   Find the surface area of the following rectangular prisms.

a

9 cm
12 cm
10 cm

_____

_____

_____

b

6.3 cm
6.3 cm
6.3 cm

_____

_____

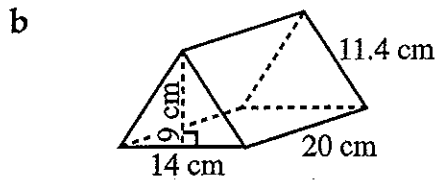_____

c

10.2 cm
36.8 cm
12.5 cm

_____

_____

_____
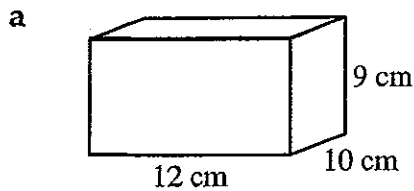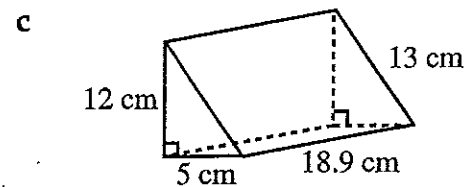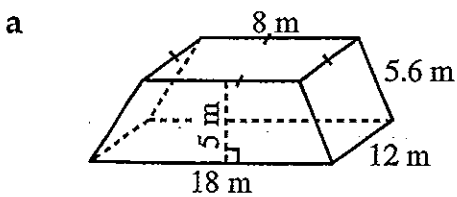
QUESTION 2   Find the surface area of the following triangular prisms.

a

10.8 cm
10 cm
15 cm
8 cm

_____

_____

b

11.4 cm
9 cm
14 cm
20 cm

_____

_____
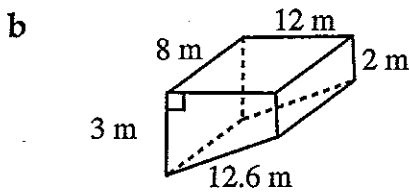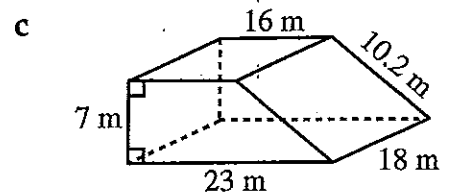
c

13 cm
12 cm
5 cm
18.9 cm

_____

_____

QUESTION 3   Find the surface area of the following trapezoidal prisms.

a

8 m
5.6 m
5 m
12 m
18 m

_____

_____

b

12 m
8 m
2 m
3 m
12.6 m

_____

_____

c

16 m
10.2 m
7 m
23 m
18 m

_____

_____

QUESTION 4   Find the surface area of the following cylinders.

a

7 cm
20 cm

_____

_____

b

18 cm
8 cm

_____

_____

c

12 cm
24.6 cm

_____

_____
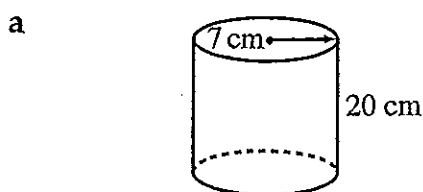
Surface area and volume

UNIT 2: Surface area of pyramids

QUESTION 1   Calculate the surface area of the following square pyramids.

a
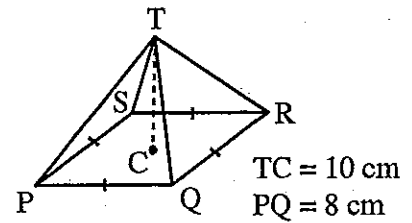
15 cm
12 cm

b

TC = 10 cm
PQ = 8 cm

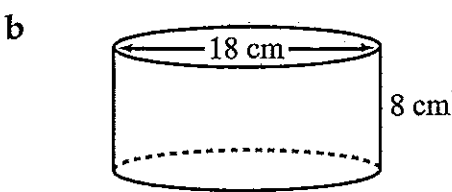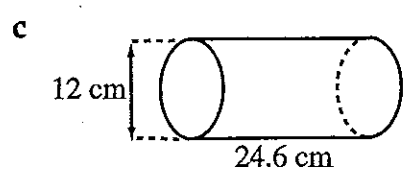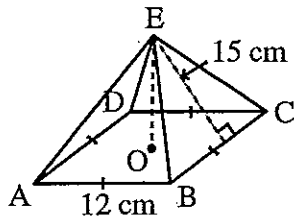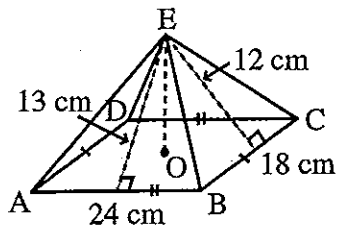**QUESTION 2**   Calculate the surface area of the following rectangular pyramids.

a

12 cm
13 cm
18 cm
24 cm

b

TC = 9 cm
PQ = 16 cm
QR = 10 cm

QUESTION 3   Calculate the surface area of the following pyramids.

a

EO = 8 cm
AB = 10 cm

b

TC = 20 cm
PQ = 18 cm
QR = 12 cm
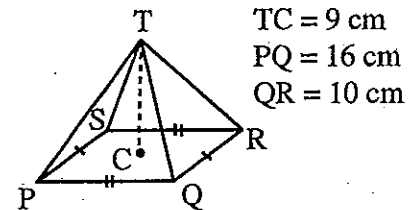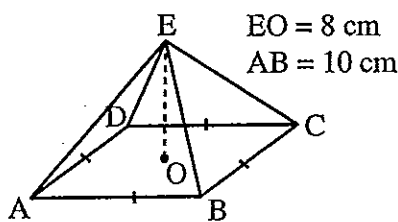
Surface area and volume

UNIT 3: Surface area of a cone

QUESTION 1 Find the *curved* surface area of the following cones correct to two decimal places.

a

12 cm

8 cm

_____

_____

b

15 cm

7 cm

_____

_____

QUESTION 2 Find the *curved* surface area of the following cones correct to one decimal place.

a

18 cm

12 cm

_____

_____

b

34 cm

28 cm

_____

_____
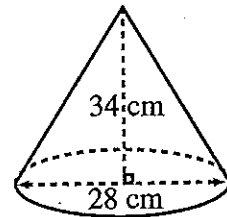
QUESTION 3 Find the surface area (including base) of the following cones. Give answers in terms of π.

a Radius 12 cm and slant height 10 cm. _____

b Radius 16 cm and height 12 cm. _____

c Diameter 56 cm and height 30 cm. _____

QUESTION 4 Find the surface area of the following solids.

a

8 cm

6 cm

7 cm

_____

_____

_____

b

T

S   R

P   M   Q

TL = 8 cm
LM = 10 cm
LR = 4 cm
MQ = 9 cm

_____

_____

Surface area and volume

UNIT 4: Surface area of a sphere

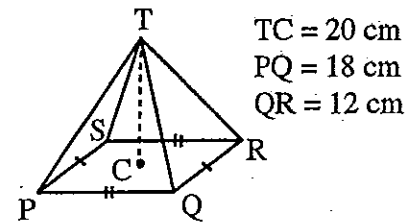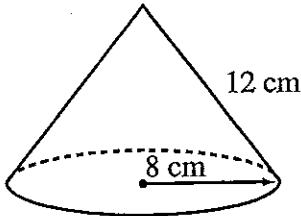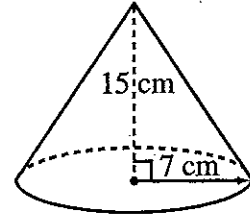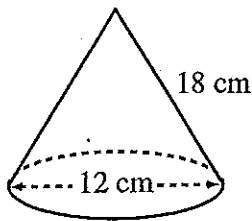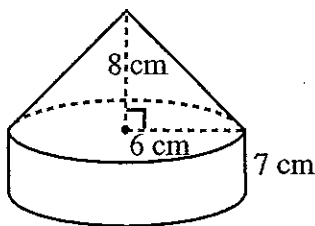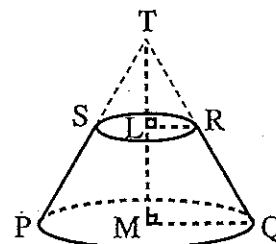QUESTION 1   Find the surface area of the following spheres with:

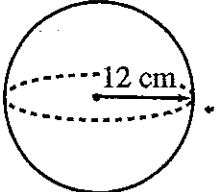a   radius = 7 cm

b   diameter = 18 cm
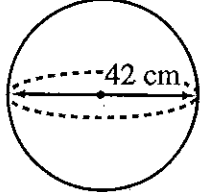
c   radius = 28 cm

d   diameter = 42 cm

e   radius = 8.3 cm
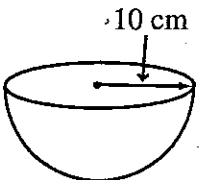
f   diameter = 23.9 cm
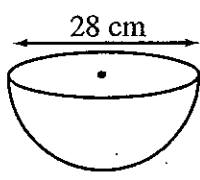
QUESTION 2   Calculate the surface area of the following spheres. Leave your answer in terms of π.

a

12 cm

b

42 cm

QUESTION 3   Calculate the surface area of the following hemispheres correct to two decimal places.

a

10 cm

b

28 cm
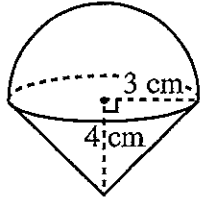
QUESTION 4   Find the surface area of the following solids correct to three significant figures.

a

10 cm

b

35 cm

c

3 cm
4 cm

QUESTION 5   A sphere has a surface area of 360 cm². Find its radius correct to two decimal places.

Surface area and volume

UNIT 5: Volume of different solids
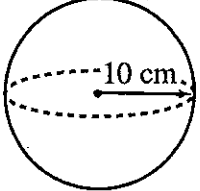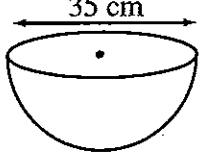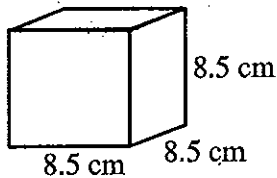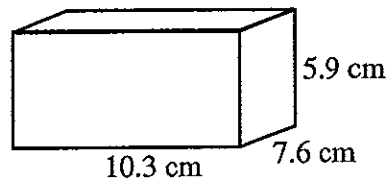
QUESTION **1**   Find the volume of the following rectangular prisms (give answer correct to one decimal place).

a

8.5 cm
8.5 cm   8.5 cm

b

5.9 cm
10.3 cm   7.6 cm

c

5.6 cm
18.8 cm   6.3 cm
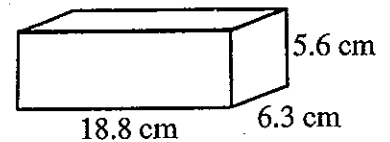
QUESTION **2**   Find the volume of the following triangular prisms (give answer correct to four significant figures).

a

14 cm
12 cm   25.8 cm

b

10 cm
6 cm   15.7 cm

c

12 cm
18.6 cm   30 cm
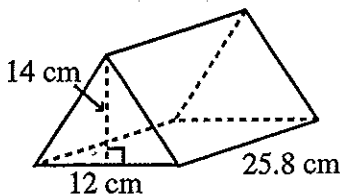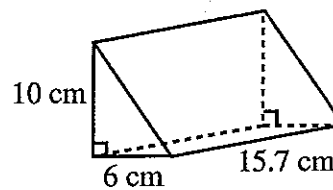
QUESTION **3**   Find the volume of the following trapezoidal prisms (give answer correct to two decimal places).

a

21.1 cm
10.5 cm   16.4 cm
30.9 cm

b

12 m
8 m   3 m
4 m
15.6 m

c

25 cm
8.5 cm
28.6 cm   10.9 cm

QUESTION **4**   Find the volume of the following solids.

a

3 m
5 m
12 m   15 m

b

5 m
15 m   10 m
16 m   13 m

c

42 cm
56 cm
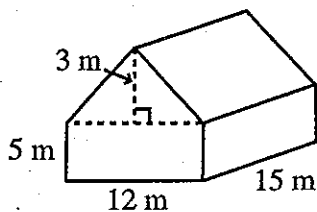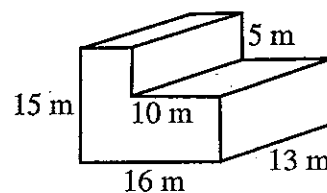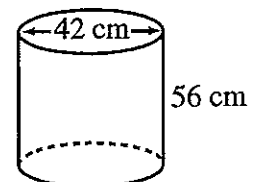
Surface area and volume

UNIT 6: Volume of pyramids

QUESTION **1**   Calculate the volume of the following square pyramids correct to one decimal place.
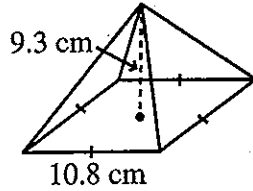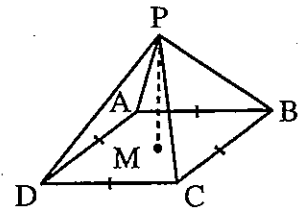
a

9.3 cm

10.8 cm

b

P

A   B
M
D   C

BC = 8.7 cn
DC = 8.7 cr
PM = 6.9 cr

_____

_____

_____

_____

QUESTION **2**   Calculate the volume of the following rectangular pyramids.

a

6.8 cm

8.6 cm

15.7 cm

b

1.6 m

1.9 m

2.3 m

_____

_____

_____

_____

QUESTION **3**   Calculate the volume of the following pyramids.

a

7.5 cm

9.3 cm

9.3 cm

b

10.2 cm

9.6 cm

23.8 cm

_____

_____

_____

_____
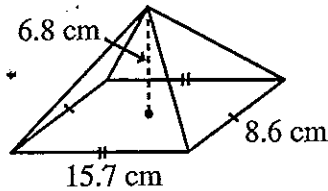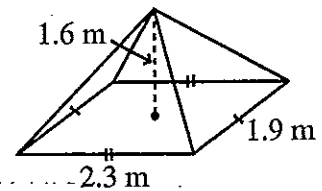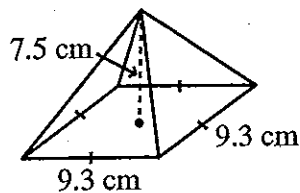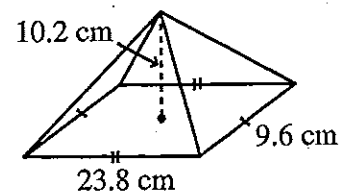
QUESTION **4**   Calculate the volume of the following solids correct to one decimal place.

a

P

A

M

B   D   C
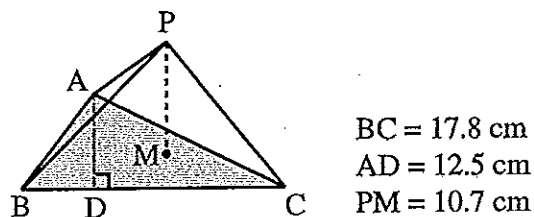
BC = 17.8 cm
AD = 12.5 cm
PM = 10.7 cm

b

5.1 m

2.3 m

6.8 m

10.5 m

_____

_____

_____

_____

Surface area and volume
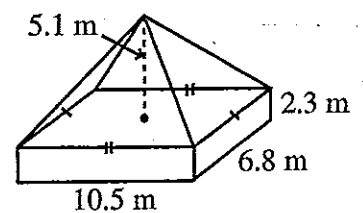
UNIT 7: Volume of a cone

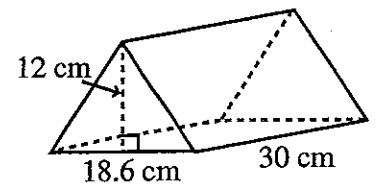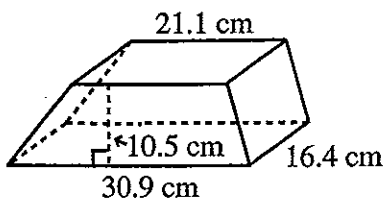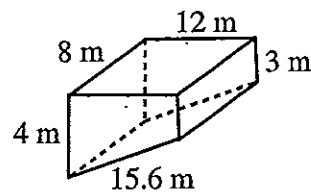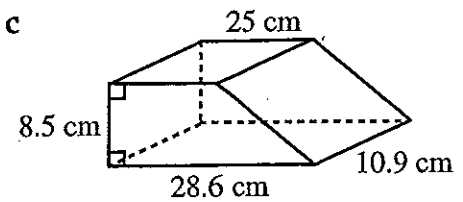QUESTION 1   Find the volume of the following cones correct to one decimal place.
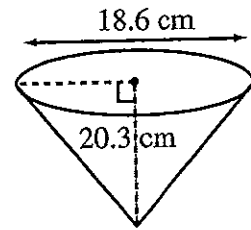
a

6.9 cm

4.1 cm

b

18.6 cm

20.3 cm

_____

_____

QUESTION 2   Find the volume of the following cones correct to two decimal places.

a

h

6.5 m

3.6 m

b

4.8 m

6 m h

_____

_____
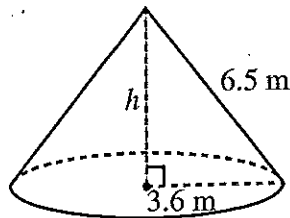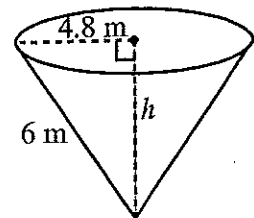
QUESTION 3

a   A cone has a base radius of 8 cm and a height of 15 cm. Find its volume.

_____

b   Find the volume of a cone of height 7.9 cm and base diameter 5.2 cm.

_____

c   Find the volume of a cone that has a slant height of 25 cm and base diameter of 30 cm.

_____

QUESTION 4   Find the volume of the following solids.

a

18 cm

16 cm

20 cm

b

T

S   R

P   M   Q

TL = 8 cm
LM = 10 cm
LR = 4 cm
MQ = 9 cm

_____

_____
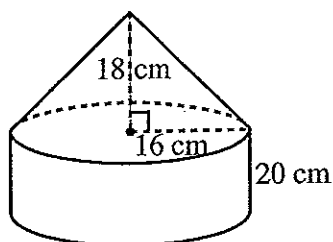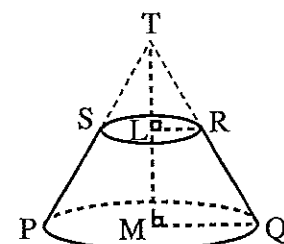
Surface area and volume

UNIT 8: Volume of a sphere

QUESTION 1   Find the volume of the following spheres (correct to one decimal place) with:

a   radius = 9 cm

b   diameter = 20 cm

c   radius = 30 cm

d   diameter = 35 cm

e   radius = 15.3 cm

f   diameter = 56 cm

QUESTION 2   Calculate the volume of the following spheres correct to one decimal place.

a
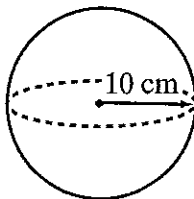
b
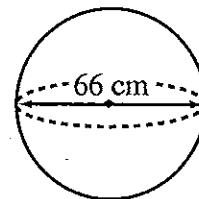
QUESTION 3   Calculate the volume of the following hemispheres correct to one decimal place.
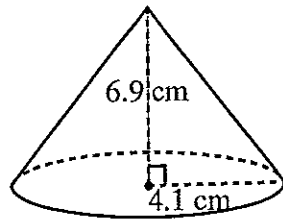
a
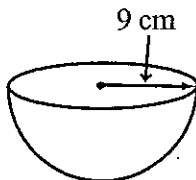
b
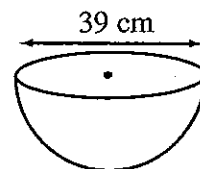
QUESTION 4   Find the volume of the following solids correct to two decimal places.

a
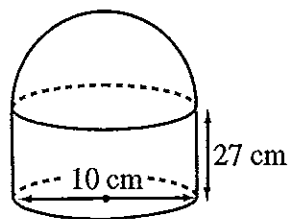
b
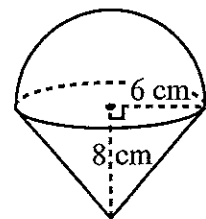
Surface area and volume

UNIT 9: Practical applications of surface area and volume

QUESTION **1**   The radius of the Earth is approximately 6400 km. Calculate:

a   the surface area in square kilometres.   b   the volume correct to four significant figure

QUESTION **2**   A spherical balloon has a radius of 4.56 metres. Calculate:

a   its surface area correct to one decimal place.   b   its volume correct to two decimal places.

QUESTION **3**   A conical tent has a base diameter of 6.5 metres and a slant height of 6 metres. Find tl
area of canvas used for this tent.

QUESTION **4**   The diameter of the base of an oil can in the shape of a cone is 12 cm and its height is
10 cm. Find:

a   its volume in cubic centimetres.   b   its capacity to the nearest millilitre.

QUESTION **5**   A rectangular swimming pool with uniform depth is 25 metres long, 6 metres wide
and 2.5 metres deep. It is to be tiled. Calculate:

a   the cost of tiling it at $46 per square metre.   b   its capacity to the nearest litre.

Surface area and volume

Instructions for SECTION 1
- You have 15 minutes to answer Section 1
- Each question is worth 2 marks
- Attempt ALL questions
- Calculators are NOT to be used
- Fill in only ONE CIRCLE for each question

1 Find the area of a square with side length 15 cm.

   (A) 450 cm²   (B) 225 cm²   (C) 60 cm²   (D) None of these

2 Calculate the volume of a cube with side length 7 cm.

   (A) 42 cm³   (B) 243 cm³   (C) 343 cm³   (D) None of these

3 A rectangular prism has sides of length 7 cm, 9 cm and 11 cm. Find its volume.

   (A) 27 cm³   (B) 963 cm³   (C) 693 cm³   (D) 396cm³

4 A cube has a volume of 3375 cm³. Find the length of each side of the cube.

   (A) 5 cm   (B) 15 cm   (C) 25 cm   (D) 35 cm

5 How many square centimetres are in a square metre?

   (A) 100   (B) 1000   (C) 10 000   (D) 100 000

6 A cone has a base diameter of 12 cm and a vertical height of 8 cm. Calculate its volume.

   (A) 8π cm³   (B) 24π cm³   (C) 72π cm³   (D) 96π cm³

7 The volume of a sphere of radius 5 cm is closest to

   (A) 515 cm³   (B) 524 cm³   (C) 864 cm³   (D) 1765 cm³

8 Approximately how many spherical balls of diameter 0.5 cm could be made from a melted down cube of side length 5 cm?

   (A) 19   (B) 190   (C) 1900   (D) 19 000

9 The volume of a cone with diameter 7 cm and height 8 cm is closest to

   (A) 56 cm³   (B) 103 cm³   (C) 392 cm³   (D) 448 cm³

10 The volume of a cylinder with diameter 5 m and height 4 m is closest to

   (A) 57 m³   (B) 69 m³   (C) 79 m³   (D) 89 m³

Total marks achieved for SECTION 1

Surface area and volume
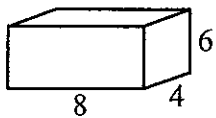
Instructions for SECTION 2
- You have 20 minutes to answer ALL of Section 2
- Each question is worth 2 marks
- Attempt ALL questions
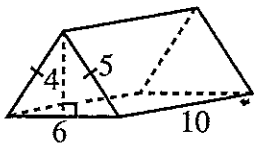- Calculators may be used

Questions	Answers	Marks

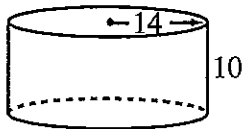Find the surface area and volume of the following.
All measurements are in centimetres.

1 Surface area = _____ **2**
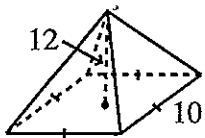
2 Volume = _____ **2**

3 Surface area = _____ **2**

4 Volume = _____ **2**

5 Surface area = _____ **2**

6 Volume = _____ **2**

7 Surface area = _____ **2**
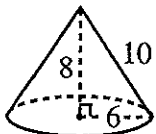
8 Volume = _____ **2**

9 Surface area = _____ **2**

10 Volume = _____ **2**
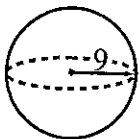
11 Surface area = _____ **2**

12 Volume = _____ **2**
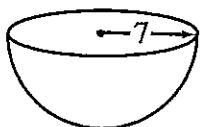
13 Surface area = _____ **2**

14 Volume = _____ **2**

15 Find the surface area of a sphere with radius equal to 14 cm.   _____   **2**

Total marks achieved for SECTION 2   30

Answers

1 a

x	-4	-2	-1	-0.5	0	0.5	1	2	4
$y = \dfrac{1}{x}$	$-\frac{1}{4}$	$-\frac{1}{2}$	-1	-2	–	2	1	$\frac{1}{2}$	$\frac{1}{4}$
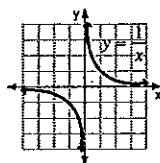
b

x	-4	-2	-1	-0.5	0	0.5	1	2	4
$y = \dfrac{4}{x}$	-1	-2	-4	-8	–	8	4	2	1

2

3
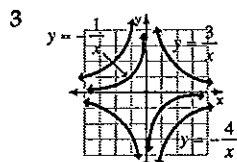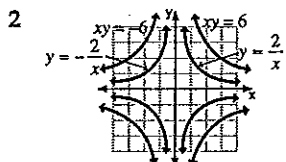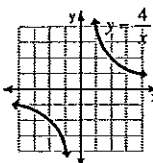
1 a

x	-2	-1	0	1	2	3
$y = 2^x$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8

b

x	-3	-2	-1	0	1	2	3
$y = 2^{-x}$	8	4	2	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$

2
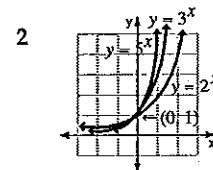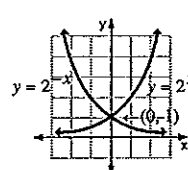
3

x	-1	0	1	2	3
3^x	$\frac{1}{3}$	1	3	9	27
3^{-x}	3	1	$\frac{1}{3}$	$\frac{1}{9}$	$\frac{1}{27}$
$\dfrac{3^x + 3^{-x}}{2}$	1.7	1	1.7	4.6	13.5
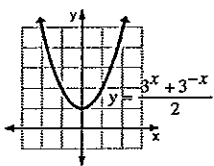
1 a straight line **b** hyperbola **c** straight line **d** parabola **e** parabola **f** exponential **g** parabola **h** hyperbola **i** non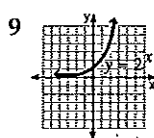e of these **j** circle **k** exponential **l** circle **2 a** D **b** H **c** F **d** G **e** I **f** C **g** A **h** B **i** E **j** L **k** J **l** K

3 a

b

c
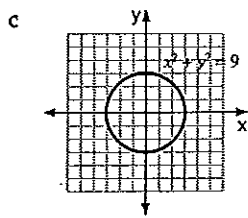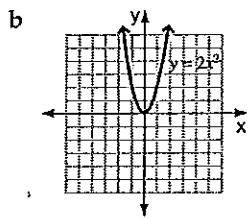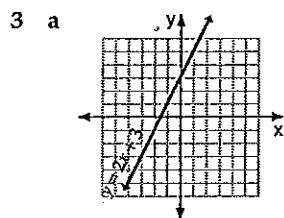
1 A **2** A **3** C **4** A **5** A **6** D **7** C **8** C **9** B **10** C

1

 2 **3** **4** **5** **6** **7** **8**
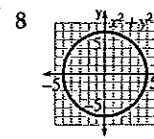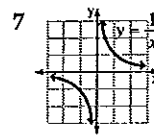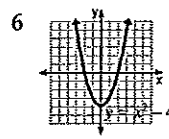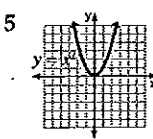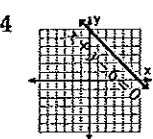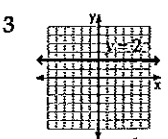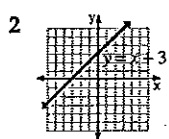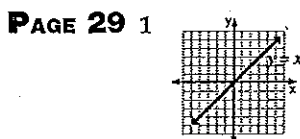
9 **10** $x^2 + y^2 = 81$ **11** $r = 1$ unit, centre $(0, 0)$ **12** x intercepts: $x = 1$ and 7, y intercept $= 7$ **13** $x = 4$ **14** $(4, -9)$ **15**
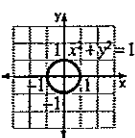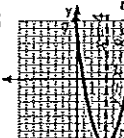
1 a 654 cm² **b** 238.14 cm² **c** 1925.72 cm² **2 a** 524 cm² **b** 862 cm² **c** 627 cm² **3 a** 544.4 cm² **b** 296.8 cm² **c** 1238.6 cm² **4 a** 1187.5 cm² **b** 961.3 cm² **c** 1153.6 cm²

1 a 504 cm² **b** 236.3 cm² **2 a** 960 cm² **b** 445.1 cm² **3 a** 288.7 cm² **b** 855.1 cm²

1 a 301.6 cm² **b** 364 cm² **2 a** 452.4 cm² **b** 731.3 cm² **3 a** 264π cm² **b** 576π cm² **c** 1932π cm² **4 a** 180π cm² **b** 761.2 cm²

1 a 196π cm² **b** 324π cm² **c** 3136π cm² **d** 7056π cm² **e** 865.7 cm² **f** 1794.5 cm² **2 a** 576π cm² **b** 1764π cm² **3 a** 461.81 cm² **b** 1847.26 cm² **4 a** 260 cm² **b** 2890 cm² **c** 104 cm² **5** 5.35 cm

1 a 614.1 cm³ **b** 461.9 cm³ **c** 663.3 cm³ **2 a** 2167 cm³ **b** 471.0 cm³ **c** 3348 cm³ **3 a** 4477.20 cm³ **b** 336.00 cm³ **c** 2483.02 cm³ **4 a** 1170 m³ **b** 2470 m³ **c** 24 696π cm³

Answers

(handwritten notes: 614.1, 2167, 4477.2)

PAGE 35 1 a 361.6 cm³ b 174.1 cm³ 2 a 306 cm³ b 2.33 m³ 3 a 216.2 cm³ b 776.8 cm³ 4 a 396.8 cm³ b 285.6 m³

PAGE 36 1 a 121.5 cm³ b 1838.6 cm³ 2 a 73.45 m³ b 86.86 m³ 3 a 1005.3 cm³ b 55.9 cm³ c 4712.4 cm³ 4 a 20 910.4 cm³ b 1392.8 cm

PAGE 37 1 a 3053.6 cm³ b 4188.8 cm³ c 113 097.3 cm³ d 22 449.3 cm³ e 15 002.5 cm³ f 91 952.3 cm³ 2 a 4188.8 cm³ b 150 532.6 cm 3 a 1526.8 cm³ b 15 529.7 cm³ 4 a 2382.37 cm³ b 753.98 cm³

PAGE 38 1 a 5.1472×10^8 km² b 1.098×10^{12} km³ 2 a 261.3 m² b 397.18 m³ 3 61.26 m² 4 a 377 cm³ b 377 mL 5 a \$14 030 b 375 kL

PAGE 39 1 B 2 C 3 C 4 B 5 C 6 D 7 B 8 C 9 B 10 C

PAGE 40 1 208 cm² 2 192 cm³ 3 172 cm² 4 120 cm³ 5 672π cm² 6 1960π cm³ 7 360 cm² 8 400 cm³ 9 96π cm² 10 96π cm³

11 324π cm² 12 972π cm³ 13 147π cm² 14 $\frac{686\pi}{3}$ cm³ 15 784π cm²
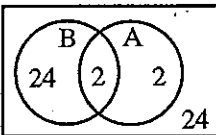
PAGE 41 1 a $\frac{1}{4}$ b $\frac{1}{2}$ c $\frac{1}{13}$ d $\frac{3}{4}$ e $\frac{1}{26}$ f $\frac{1}{2}$ 2 a $\frac{1}{3}$ b $\frac{2}{3}$ c $\frac{1}{3}$ 3 a $\frac{1}{6}$ b $\frac{1}{2}$ c $\frac{2}{3}$ d 0 e $\frac{1}{2}$ f $\frac{1}{3}$ 4 a $\frac{2}{5}$ b c $\frac{4}{15}$ d $\frac{3}{5}$ e 0 f $\frac{3}{5}$ 5 a 0 b 1 c $\frac{1}{3}$ d 1 e $\frac{1}{3}$ f 1 6 a $\frac{4}{7}$ b $\frac{3}{7}$ c $\frac{1}{7}$ d 0 e $\frac{4}{7}$ f $\frac{2}{7}$ 7 a $\frac{4}{11}$ b $\frac{7}{11}$ c $\frac{2}{11}$ d $\frac{1}{}$ e 0 f $\frac{1}{11}$
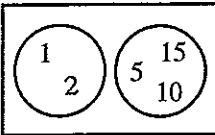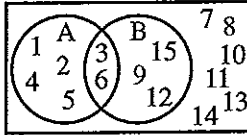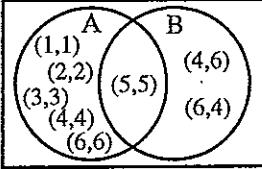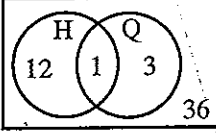
PAGE 42 1 a $\frac{1}{8}$ b $\frac{3}{8}$ c $\frac{7}{8}$ 2 a 12 b $\frac{2}{3}$ c $\frac{1}{3}$ d $\frac{7}{12}$ 3 a $\frac{3}{10}$ b $\frac{1}{10}$ c $\frac{3}{5}$ 4 a $\frac{1}{8}$ b $\frac{3}{8}$ c $\frac{3}{8}$ d $\frac{1}{2}$ e $\frac{1}{2}$ f $\frac{1}{8}$

PAGE 43 1 a $\frac{5}{18}$ b $\frac{5}{18}$ c $\frac{1}{6}$ d $\frac{5}{18}$ e $\frac{5}{9}$ 2 $\frac{4}{25}$ 3 a $\frac{3}{20}$ b $\frac{51}{380}$ c $\frac{3}{190}$ d $\frac{68}{95}$ e $\frac{27}{95}$ f $\frac{51}{190}$ 4 a $\frac{5}{11}$ b $\frac{3}{11}$

PAGE 44 1 a

1,1	2,1	3,1	4,1	5,1	6,1
1,2	2,2	3,2	4,2	5,2	6,2
1,3	2,3	3,3	4,3	5,3	6,3
1,4	3,4	3,4	4,4	5,4	6,4
1,5	2,5	3,5	4,5	5,5	6,5
1,6	2,6	3,6	4,6	5,6	6,6

2 a $\frac{1}{36}$ b $\frac{1}{6}$ c $\frac{1}{9}$ d $\frac{1}{12}$ e $\frac{1}{12}$ f $\frac{1}{6}$ g $\frac{1}{6}$ h $\frac{1}{4}$ i $\frac{1}{12}$ j $\frac{11}{32}$ k 0

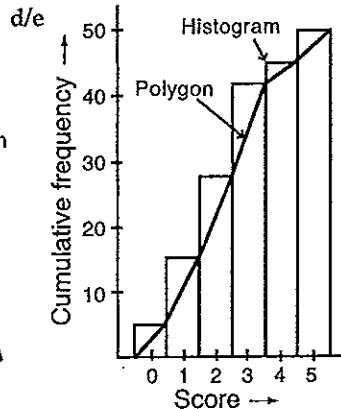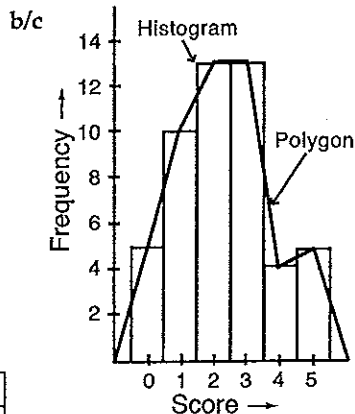3 rolling one die 4 $\frac{1}{4}$ 5 $\frac{1}{4}$ 6 rolling one die

PAGE 45

1 $P(BA) = \frac{7}{13}$

2 a $P = \frac{1}{3}$ b $P = \frac{3}{5}$

3 $P = \frac{2}{9}$

4 $P = \frac{4}{13}$

PAGE 46

1 a

x	Tally	f	c.f.
0	卌	5	5
1	卌 卌	10	15
2	卌 卌 |||	13	28
3	卌 卌 |||	13	41
4						4	45
5	卌	5	50

b/c

d/e

2 a 2.32 b 2 and 3 c 5 d 2

e

Score	0	1	2	3	4	5
Relative f	0.1	0.2	0.26	0.26	0.08	0.1