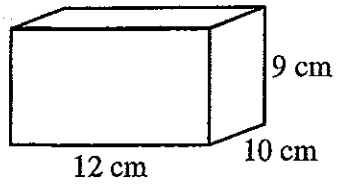
CHAPTER 4
Surface area and volume

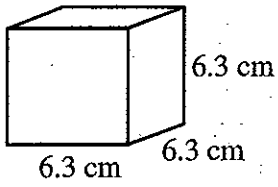
UNIT 1: Surface area of different solids

QUESTION 1 Find the surface area of the following rectangular prisms.

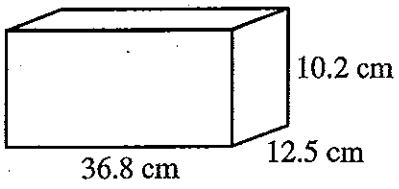
a



b

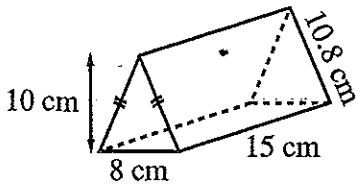


c

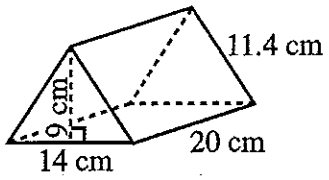


QUESTION 2 Find the surface area of the following triangular prisms.

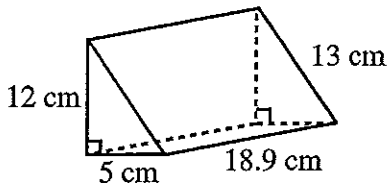
a



b

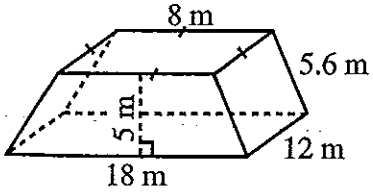


c

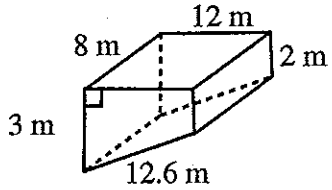


QUESTION 3 Find the surface area of the following trapezoidal prisms.

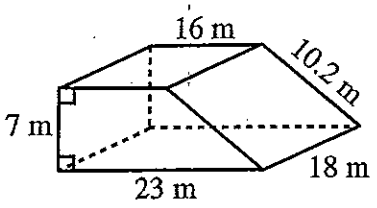
a



b

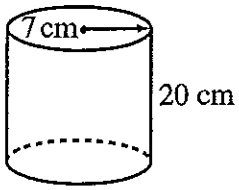


c

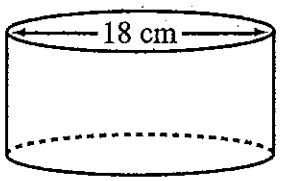


QUESTION 4 Find the surface area of the following cylinders.

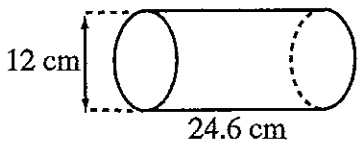
a



b



c

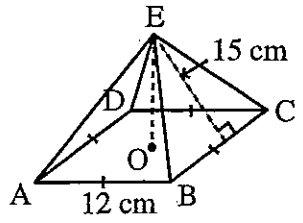


Surface area and volume

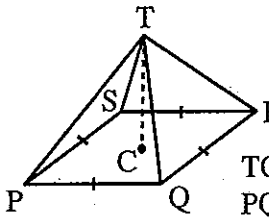
UNIT 2: Surface area of pyramids

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

a



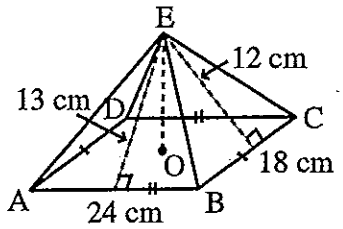
b



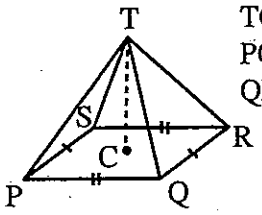
TC = 10 cm
PQ = 8 cm

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

a



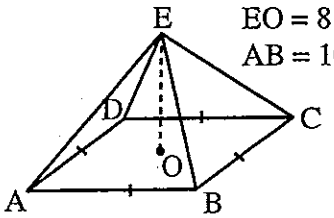
b



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

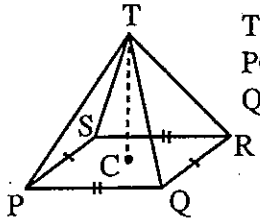
QUESTION 3 Calculate the surface area of the following pyramids.

a



EO = 8 cm
AB = 10 cm

b



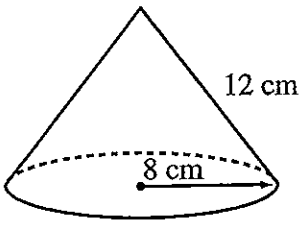
TC = 20 cm
PQ = 18 cm
QR = 12 cm

Surface area and volume

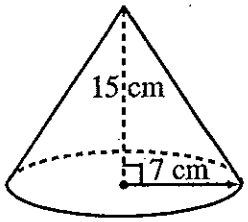
UNIT 3: Surface area of a cone

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

a

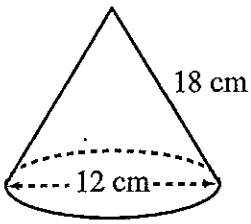


b

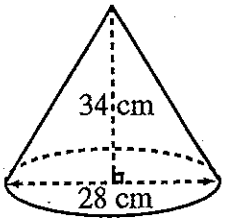


QUESTION 2 Find the *curved* surface area of the following cones correct to one decimal place.

a



b



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

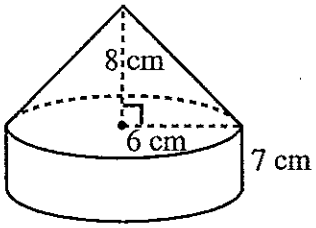
a Radius 12 cm and slant height 10 cm.

b Radius 16 cm and height 12 cm.

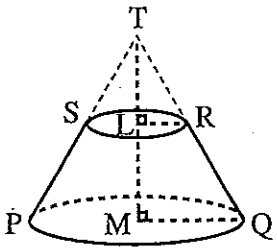
c Diameter 56 cm and height 30 cm.

QUESTION 4 Find the surface area of the following solids.

a



b



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

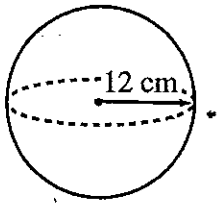
d diameter = 42 cm

e radius = 8.3 cm

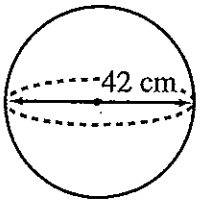
f diameter = 23.9 cm

QUESTION 2 Calculate the surface area of the following spheres. Leave your answer in terms of π.

a

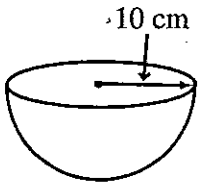


b

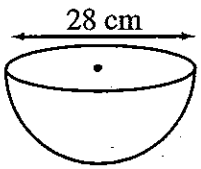


QUESTION 3 Calculate the surface area of the following hemispheres correct to two decimal places.

a

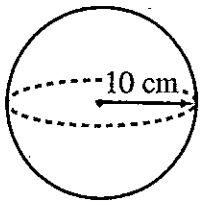


b

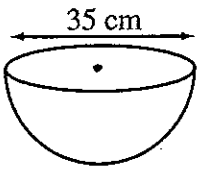


QUESTION 4 Find the surface area of the following solids correct to three significant figures.

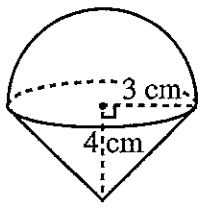
a



b



c



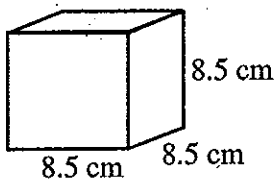
QUESTION 5 A sphere has a surface area of 360 cm^2. Find its radius correct to two decimal places.

Surface area and volume

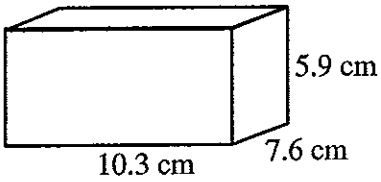
UNIT 5: Volume of different solids

QUESTION 1 Find the volume of the following rectangular prisms (give answer correct to one decimal place).

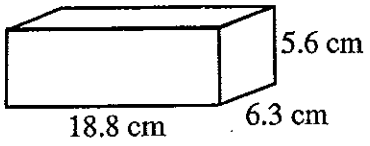
a



b

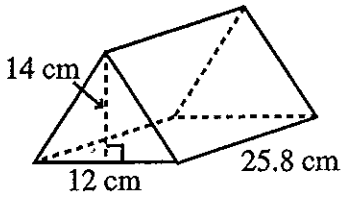


c

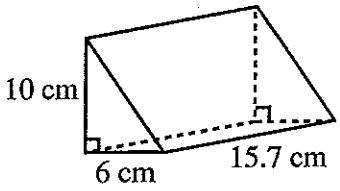


QUESTION 2 Find the volume of the following triangular prisms (give answer correct to four significant figures).

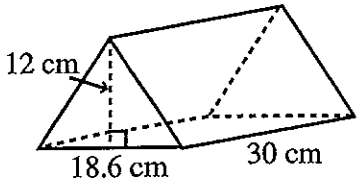
a



b

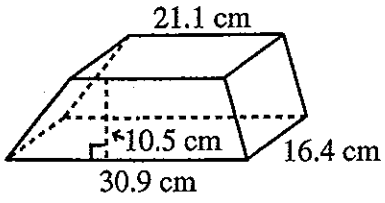


c

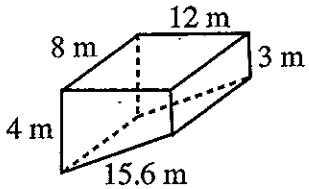


QUESTION 3 Find the volume of the following trapezoidal prisms (give answer correct to two decimal places).

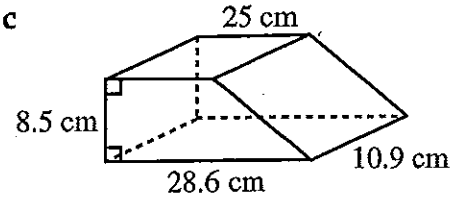
a



b

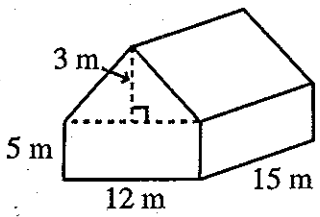


c

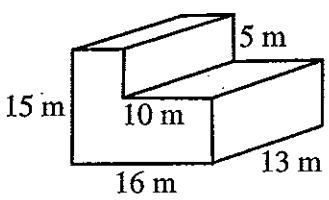


QUESTION 4 Find the volume of the following solids.

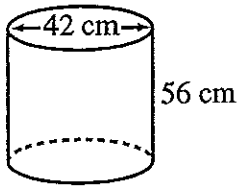
a



b



c

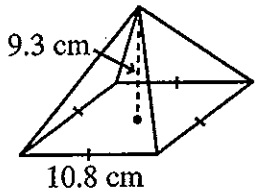


Surface area and volume

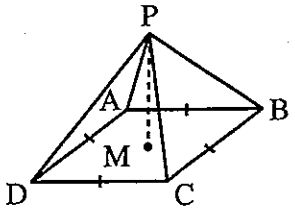
UNIT 6: Volume of pyramids

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

a



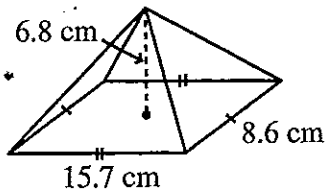
b



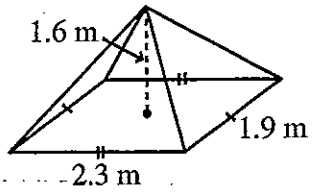
BC = 8.7 cm
DC = 8.7 cm
PM = 6.9 cm

QUESTION 2 Calculate the volume of the following rectangular pyramids.

a

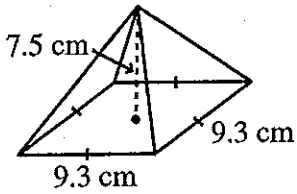


b

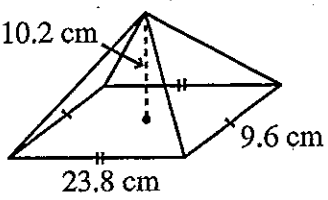


QUESTION 3 Calculate the volume of the following pyramids.

a

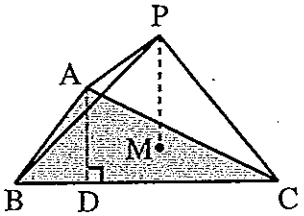


b



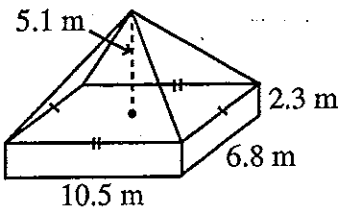
QUESTION 4 Calculate the volume of the following solids correct to one decimal place.

a



BC = 17.8 cm
AD = 12.5 cm
PM = 10.7 cm

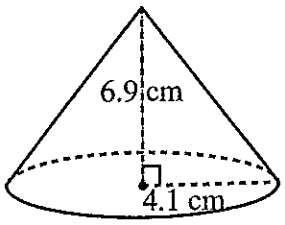
b



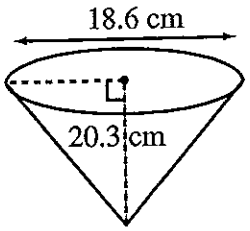
UNIT 7: Volume of a cone

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

a

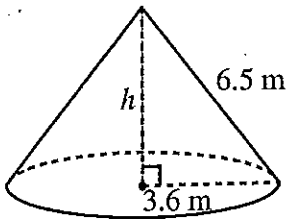


b

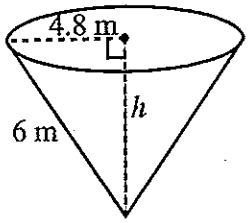


QUESTION 2 Find the volume of the following cones correct to two decimal places.

a



b



QUESTION 3

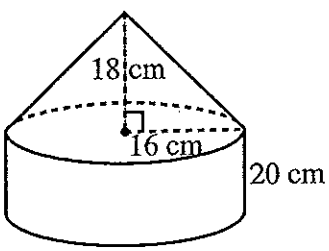
a A cone has a base radius of 8 cm and a height of 15 cm. Find its volume.

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

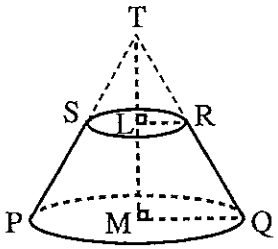
c Find the volume of a cone that has a slant height of 25 cm and base diameter of 30 cm.

QUESTION 4 Find the volume of the following solids.

a



b



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

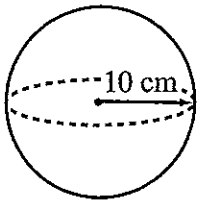
d diameter = 35 cm

e radius = 15.3 cm

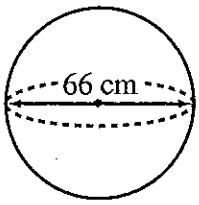
f diameter = 56 cm

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

a

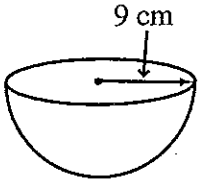


b

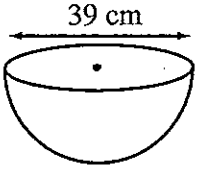


QUESTION 3 Calculate the volume of the following hemispheres correct to one decimal place.

a

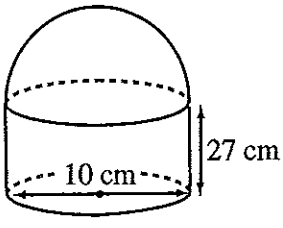


b

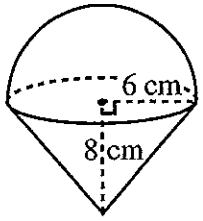


QUESTION 4 Find the volume of the following solids correct to two decimal places.

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 th 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.

Ⓐ 450 cm^2 Ⓑ 225 cm^2 Ⓒ 60 cm^2 Ⓓ None of these

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

Ⓐ 42 cm^3 Ⓑ 243 cm^3 Ⓒ 343 cm^3 Ⓓ None of these

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

Ⓐ 27 cm^3 Ⓑ 963 cm^3 Ⓒ 693 cm^3 Ⓓ 396cm^3

4 A cube has a volume of 3375 cm^3. Find the length of each side of the cube.

Ⓐ 5 cm Ⓑ 15 cm Ⓒ 25 cm Ⓓ 35 cm

5 How many square centimetres are in a square metre?

Ⓐ 100 Ⓑ 1000 Ⓒ 10 000 Ⓓ 100 000

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

Ⓐ 8π cm^3 Ⓑ 24π cm^3 Ⓒ 72π cm^3 Ⓓ 96π cm^3

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

Ⓐ 515 cm^3 Ⓑ 524 cm^3 Ⓒ 864 cm^3 Ⓓ 1765 cm^3

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

Ⓐ 19 Ⓑ 190 Ⓒ 1900 Ⓓ 19 000

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

Ⓐ 56 cm^3 Ⓑ 103 cm^3 Ⓒ 392 cm^3 Ⓓ 448 cm^3

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

Ⓐ 57 m^3 Ⓑ 69 m^3 Ⓒ 79 m^3 Ⓓ 89 m^3

Total marks achieved for SECTION 1

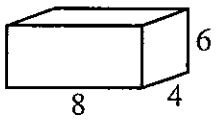
Surface area and volume

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

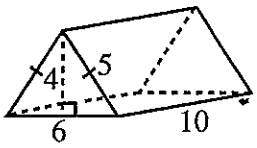
Questions	Answers	Marks

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



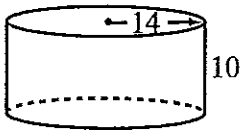
1 Surface area = _____ 2

2 Volume = _____ 2



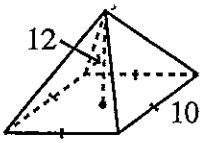
3 Surface area = _____ 2

4 Volume = _____ 2



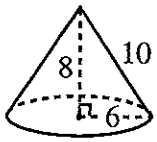
5 Surface area = _____ 2

6 Volume = _____ 2



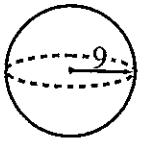
7 Surface area = _____ 2

8 Volume = _____ 2



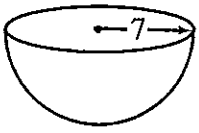
9 Surface area = _____ 2

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

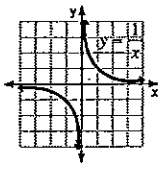
Total marks achieved for SECTION 2 ____/30

Answers

Page 25

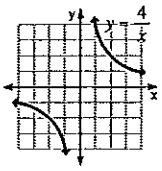
1 a

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

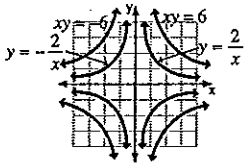


b

x	−4	−2	−1	−0.5	0	0.5	1	2	4
$y=\frac{4}{x}$	−1	−2	−4	−8	–	8	4	2	1



2



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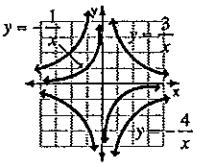


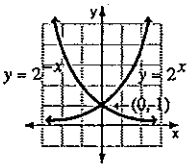
Page 26

1 a

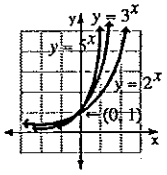
x	−2	−1	0	1	2	3
$y=2^x$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8

b

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

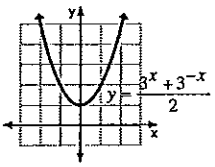


2



3

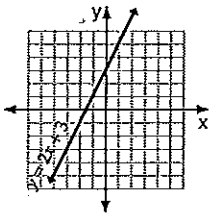
x	−1	0	1	2	3
3^x	$\frac{1}{3}$	1	3	9	27
3^{-x}	3	1	$\frac{1}{3}$	$\frac{1}{9}$	$\frac{1}{27}$
$\frac{3^x+3^{-x}}{2}$	1.7	1	1.7	4.6	13.5



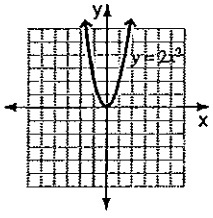
Page 27

1 a straight line b hyperbola c straight line d parabola e parabola f exponential g parabola h hyperbola i none of thes
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

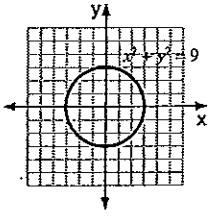
3 a



b



c

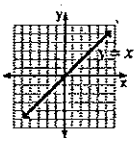


Page 28

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

Page 29

1



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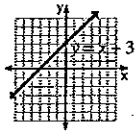
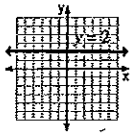
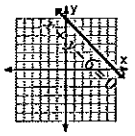


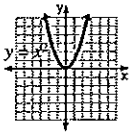
3



4



5



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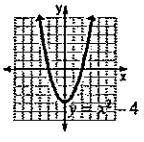

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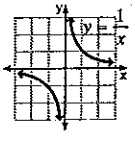

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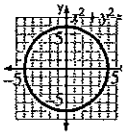

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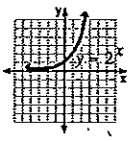
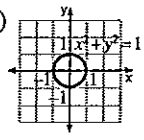
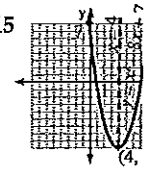


10 $x^2 + y^2 = 81$ 11 $r = 1$ unit, centre (0, 0)



12 x intercepts: $x = 1$ and 7, y intercept = 7 13 $x = 4$ 14 (4, −9) 15



Page 30

1 a 638 cm² b 238.14 cm² c 1935.72 cm² 2 a 524 cm² b 862 cm² c 627 cm² 3 a 544.4 cm² b 296.8 cm² c 1238.6 cı
4 a 1187.5 cm² b 961.3 cm² c 1153.6 cm²

Page 31

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

Page 32

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 c

Page 33

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 c
b 1847.26 cm² 4 a 260 cm² b 2890 cm² c 104 cm² 5 5.35 cm

Page 34

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 c
4 a 1170 m³ b 2470 m³ c $24\,696\pi$ cm³

Answers

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 b 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 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 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

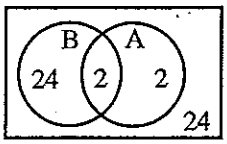
1,1	2,1	3,1	4,1	5,1	6,1
1,2	2,2	3,2	4,2	5,2	6,2
1,3	2,3	3,3	4,3	5,3	6,3
1,4	3,4	3,4	4,4	5,4	6,4
1,5	2,5	3,5	4,5	5,5	6,5
1,6	2,6	3,6	4,6	5,6	6,6

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

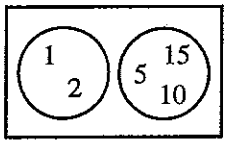
Page 45

1



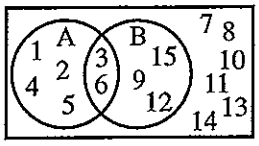
$P(BA) = \frac{7}{13}$

2 a



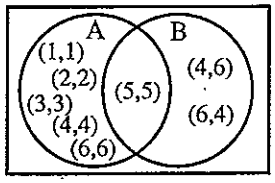
$P = \frac{1}{3}$

b



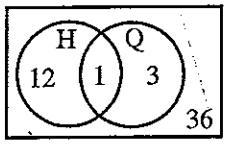
$P = \frac{3}{5}$

3



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

4



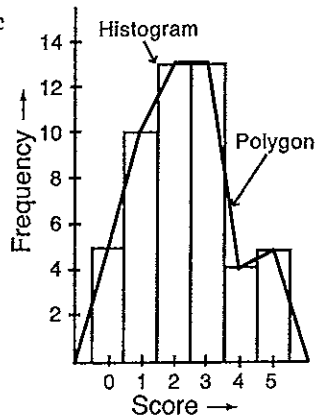
$P = \frac{4}{13}$

Page 46

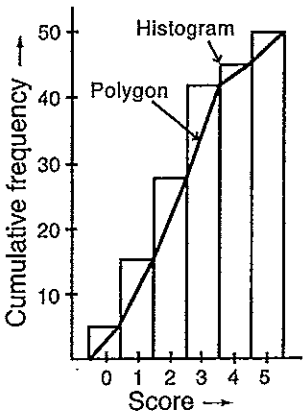
1 a

x	Tally	f	$c.f.$
0	𝍸	5	5
1	𝍸 𝍸	10	15
2	𝍸 𝍸 III	13	28
3	𝍸 𝍸 III	13	41
4	IIII	4	45
5	𝍸	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

CHAPTER 4 Surface area and volume

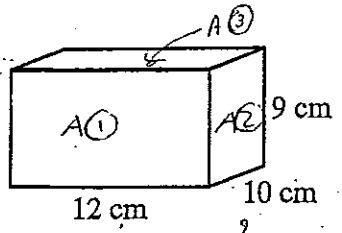
see corrections on pg 30, 34, 32, 36, 37, 38, 39, 40 !

EXCEL YEARS 9 & 10 ADVANCED MATHS
Ch. 8, 8.2.3, p. 125

UNIT 1: Surface area of different solids

QUESTION 1 Find the surface area of the following rectangular prisms.

a



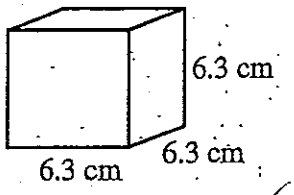
$A① = 12 \times 9 \times 4 = 432$

$A② = 10 \times 9 \times 2 = 180$ $+ 12 \times 10 \times 2$

$SA = 612\ cm^2$

636

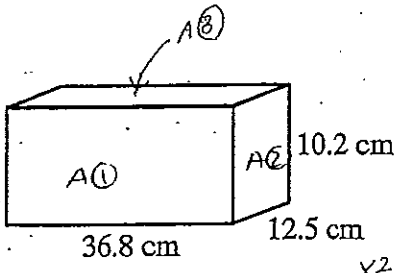
b



$SA = 6.3 \times 6.3 \times 6$

$= 238.14\ cm^2$

c



$A① = 36.8 \times 10.2 \times 4$ (×2)

$= 1501.44$

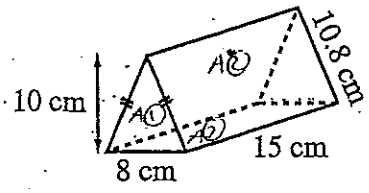
$A② = 10.2 \times 12.5 \times 2$

$= 255$

$SA = 1756.44\ cm^2$

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

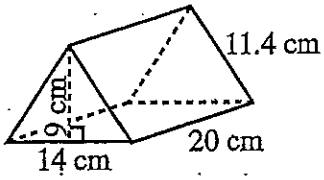
a



$2 \times \frac{1}{2} \times 8 \times 10 + 10.8 \times 15 \times 2$

$+ 8 \times 15 = 524\ cm^2$

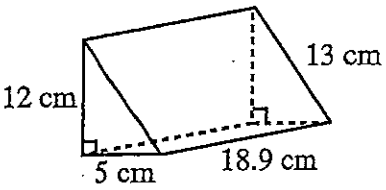
b



$2 \times \frac{1}{2} \times 14 \times 9 + 11.4 \times 20 \times 2$

$+ 14 \times 20 = 862\ cm^2$

c



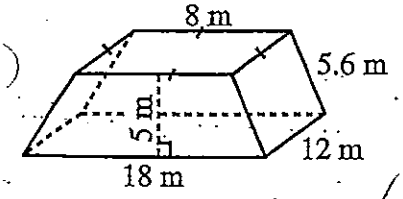
$2 \times \frac{1}{2} \times 12 \times 5 + 13 \times 18.9 +$

$12 \times 18.9 + 5 \times 18.9 =$

$627\ cm^2$

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

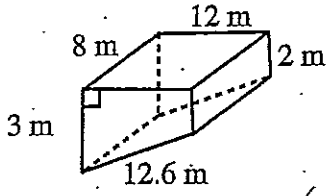
a



$\frac{1}{2}(8+18) \times 5 \times 2 + 5.6 \times 12 \times 2$

$+ 8 \times 8 + 18 \times 12 = 544.4\ cm^2$

b

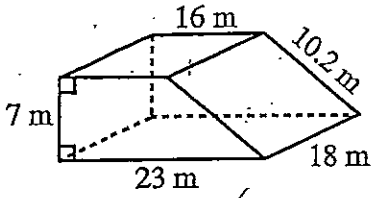


$\frac{1}{2}(2+3) \times 12 \times 2 + 8 \times 12 +$

$12.6 \times 8 + 8 \times 3 + 2 \times 8$

$= 296.8\ cm^2$

c



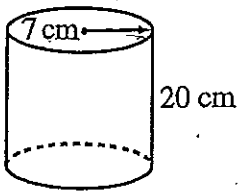
$\frac{1}{2}(23+16) \times 7 \times 2 + 10.2 \times$

$+ 7 \times 18 + 16 \times 18 + 23 \times 18$

$= 1284.6\ cm^2$

QUESTION 4 Find the surface area of the following cylinders. $2\pi r^2 + 2\pi rh$

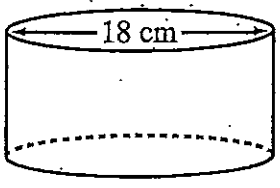
a



$2 \times \pi \times 7^2 + \pi \times 7 \times 2$

$\times 20 = 1187.5\ cm^2$

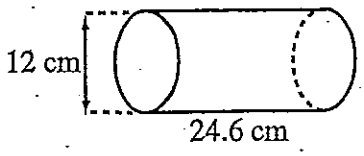
b



$2 \times \pi \times 9^2 + \pi \times 9 \times 2 \times 8$

$= 961.3\ cm^2$

c

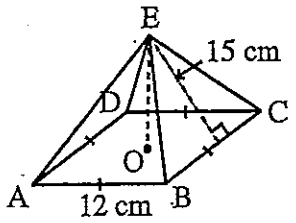


$2 \times \pi \times 6^2 + 2 \times \pi \times 6 \times$

$24.6 = 1153.6\ cm^2$

UNIT 2: Surface area of pyramids

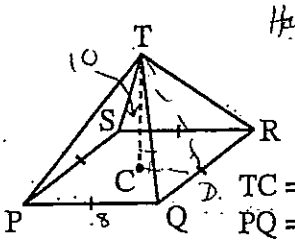
UESTION 1 Calculate the surface area of the following square pyramids.



$\frac{1}{2} \times 12 \times 15 \times 4 + 12 \times 12 = 504 cm^2$

b

Have to find TD first, please ask me!

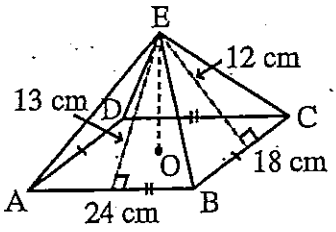


TC = 10 cm
PQ = 8 cm

$\frac{1}{2} \times 8 \times 10 \times 4 + 8^2 = 224 cm^2$

Base area

UESTION 2 Calculate the surface area of the following rectangular pyramids.



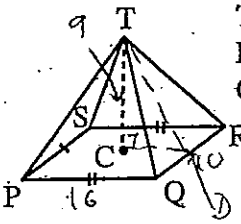
$\frac{1}{2} \times 24 \times 13 \times 2 = 312$

$\frac{1}{2} \times 18 \times 12 \times 2 = 216$

$24 \times 18 = 432$

$SA = 960 cm^2$

b



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

Find TD

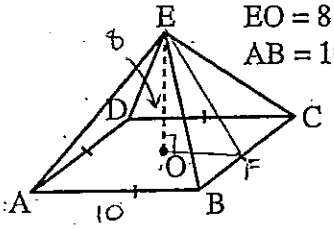
$\frac{1}{2} \times 16 \times 9 \times 2 = 144$

$\frac{1}{2} \times 10 \times 9 \times 2 = 90$

$16 \times 10 = 160$

$SA = 394 cm^2$

UESTION 3 Calculate the surface area of the following pyramids.

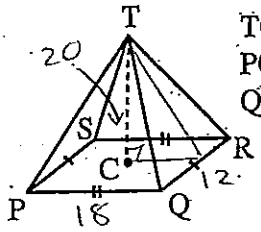


EO = 8 cm
AB = 10 cm

Find EF first.

$\frac{1}{2} \times 10 \times 8 \times 4 + 10^2 = 260 cm^2$

b



TC = 20 cm
PQ = 18 cm
QR = 12 cm

$\frac{1}{2} \times 18 \times 20 \times 2 = 360$

$\frac{1}{2} \times 12 \times 20 \times 2 = 240$

$18 \times 12 = 216$

$SA = 816 cm^2$

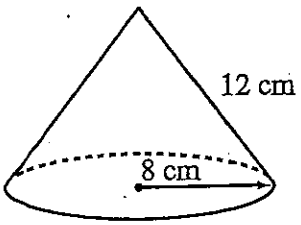
Surface area and volume

UNIT 3: Surface area of a cone

$\pi r l + \pi r^2$

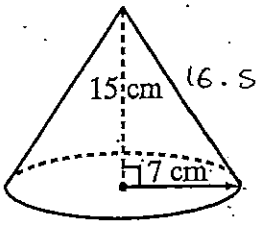
QUESTION 1 Find the *curved* surface area of the following cones correct to two decimal places.

a



$\pi \times 8 \times 12 = 301.59 cm^2$

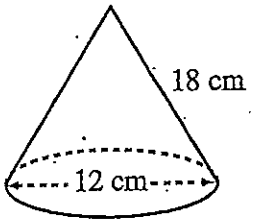
b



$\pi \times 7 \times 16.55 = 364.02 cm^2$

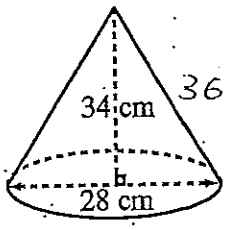
QUESTION 2 Find the *curved* surface area of the following cones correct to one decimal place.

a



$\pi \times 6 \times 18 = 339.3 cm^2$

b



$\pi \times 14 \times 36.77 = 1617.2 cm^2$

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. $264\pi cm^2$

b Radius 16 cm and height 12 cm. $576\pi cm^2$

c Diameter 56 cm and height 30 cm. ~~$2833.02\pi cm^2$~~ $784\pi cm^2$

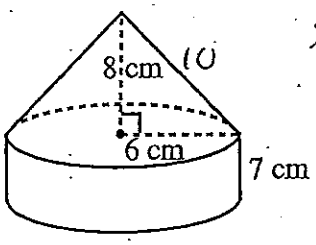
Find slant height

81

$\pi r l ① - \pi r l ② + \pi r^2 ① + \pi r^2 ②$

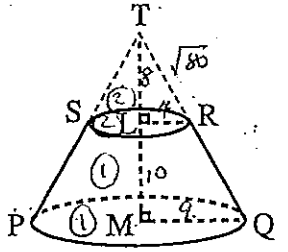
QUESTION 4 Find the surface area of the following solids.

a



$\pi r l + \pi r^2$ b
$+ 2\pi r h$

$\pi \times 6 \times 10 + \pi \times 6^2 + \pi \times 6 \times 7 \times 2$
$= 180\pi cm^2$



$81\pi + 16\pi = 97\pi$
$\pi(9 \times \sqrt{405} - 4 \times \sqrt{80})$
$= 761.3 cm^2$

32

UNIT 4: Surface area of a sphere

$SA = 4\pi r^2$

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

radius = 7 cm

$4 \times \pi \times 7^2$

$= 196\pi \text{ cm}^2$ ✓

b diameter = 18 cm

$4 \times \pi \times 9^2$

$= 324\pi \text{ cm}^2$ ✓

c radius = 28 cm

$4 \times \pi \times 28^2$

$= 3136\pi \text{ cm}^2$ ✓

diameter = 42 cm

$4 \times \pi \times 21^2$

$= 1764\pi \text{ cm}^2$ ✓

e radius = 8.3 cm

$4 \times \pi \times 8.3^2$

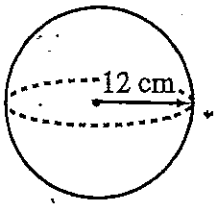
$= 865.7 \text{ cm}^2$ ✓

f diameter = 23.9 cm

$4 \times \pi \times 11.95^2$

$= 1794.51 \text{ cm}^2$ ✓

QUESTION 2 Calculate the surface area of the following spheres. Leave your answer in terms of π.

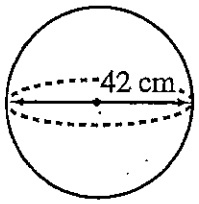


$SA = 4 \times \pi \times r^2$ ✓

$= 4 \times \pi \times 12^2$

$= 576\pi \text{ cm}^2$ ✓

b

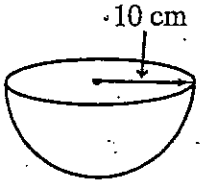


$SA = 4 \times \pi \times r^2$

$= 4 \times \pi \times 21^2$

$= 1764\pi \text{ cm}^2$ ✓

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



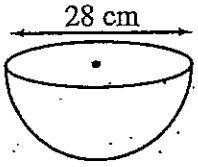
$SA = 2 \times \pi \times r^2$

$= 2 \times \pi \times 10^2$ ✓

$628.318... + \pi r^2$

$= 942.48 \text{ cm}^2$ ✓

b



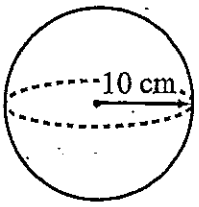
$SA = 2 \times \pi \times r^2$

$= 2 \times \pi \times 14^2$

$1231.50... + \pi r^2$

$= 1847.26 \text{ cm}^2$ ✓

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

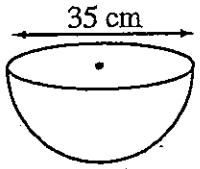


$SA = 4\pi r^2$ b

$SA = 4 \times \pi \times r^2$ ✓

$= 4 \times \pi \times 10^2$

$= 1260 \text{ cm}^2$ ✓



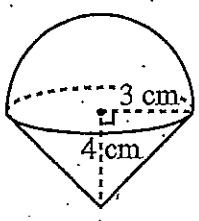
$SA = 2 \times \pi \times r^2$ ✓

$= 2 \times \pi \times 17.5^2$

$= 1920 \text{ cm}^2 + \pi r^2$

$= 2890 \text{ cm}^2$ ✓

c



$2 \times \pi \times 3^2 + \pi \times 3 \times 5$

$= 103.67...$

$= 104 \text{ cm}^2$ ✓

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

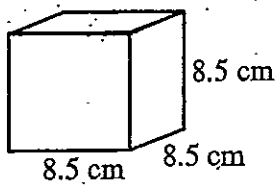
$\frac{360}{4\pi} = \frac{4\pi r^2}{4\pi}$ ✓ $r^2 = \frac{360}{4\pi} = 28.64...$ $r = 5.35 \text{ cm}$ ✓

Surface area and volume

UNIT 5: Volume of different solids

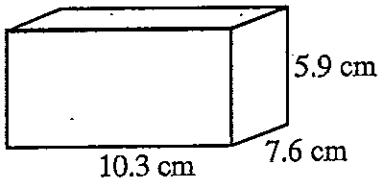
QUESTION 1 Find the volume of the following rectangular prisms (give answer correct to one decimal place).

a



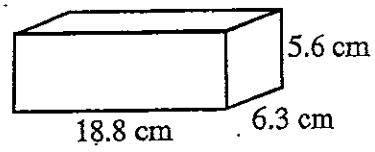
$8.5^3 = 614.1 cm^3$

b



$10.3 \times 7.6 \times 5.9$
$= 461.9 cm^3$

c

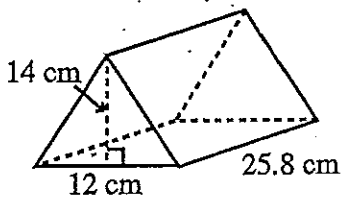


$18.8 \times 6.3 \times 5.6$
$= 663.3 cm^3$

QUESTION 2 Find the volume of the following triangular prisms (give answer correct to four significant figures).

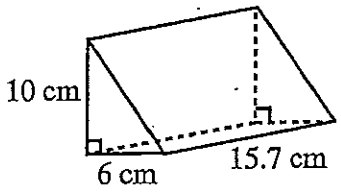
$V = Ah$

a



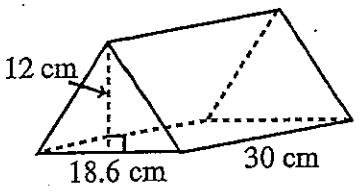
$V = (\frac{1}{2} \times 12 \times 14) \times 25.8$
$= 2167.2 cm^3$

b



$V = (\frac{1}{2} \times 6 \times 10) \times 15.7$
$= 471 cm^3$

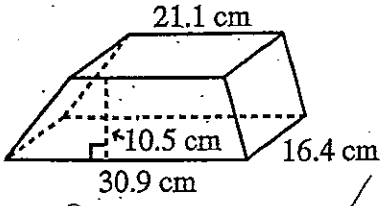
c



$V = (\frac{1}{2} \times 18.6 \times 12) \times 30$
$= 3348 cm^3$

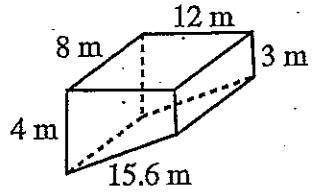
QUESTION 3 Find the volume of the following trapezoidal prisms (give answer correct to two decimal places).

a



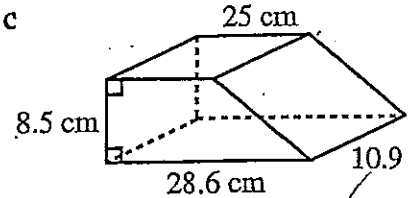
$\frac{1}{2} \times 10.5 (21.1 + 30.9) \times 16.4$
$= 4477.20 cm^3$

b



$\frac{1}{2} \times 12 (3 + 4) \times 8$
$= 336 cm^3$

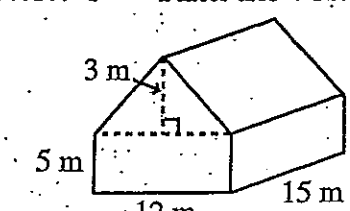
c



$\frac{1}{2} \times 8.5 (25 + 28.6) \times 10.9$
$= 2483.92 cm^3$

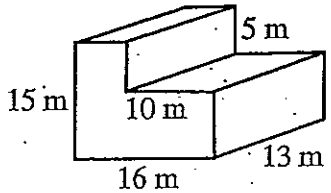
QUESTION 4 Find the volume of the following solids.

a



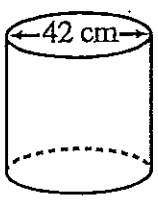
$270 + 900 = 1170 m^3$

b



$1170 + 1300 = 2470 m^3$

c



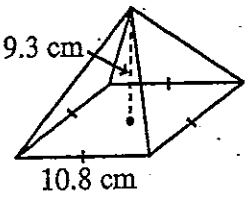
246967

Surface area and volume

UNIT 6: Volume of pyramids

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

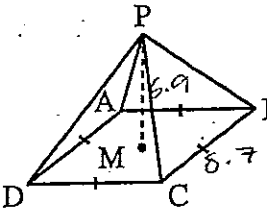
a



$V = \frac{1}{3} \times 10.8^2 \times 9.3$ ✓

$= 361.62 cm^3$ /

b



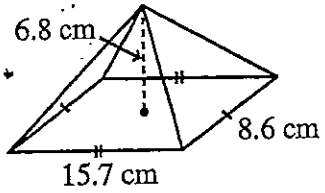
BC = 8.7 cm
DC = 8.7 cm
PM = 6.9 cm

$V = \frac{1}{3} \times 8.7^2 \times 6.9$

$= 174.1 cm^3$ ✓

QUESTION 2 Calculate the volume of the following rectangular pyramids.

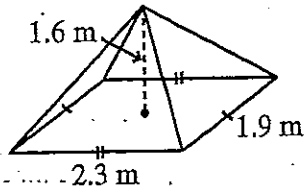
a



$V = \frac{1}{3} \times (15.7 \times 8.6) \times 6.8$

$= 306 cm^3$ /

b

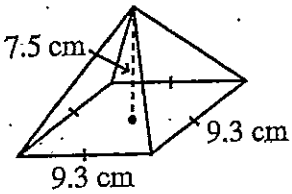


$V = \frac{1}{3} \times (2.3 \times 1.9) \times 1.6$

$= 2.33 cm^3$ ✓

QUESTION 3 Calculate the volume of the following pyramids.

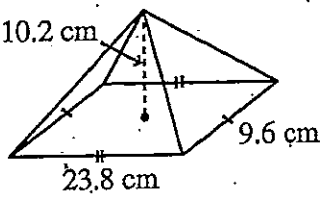
a



$V = \frac{1}{3} \times 9.3^2 \times 7.5$ ✓

$= 216.2 cm^3$ ✓

b

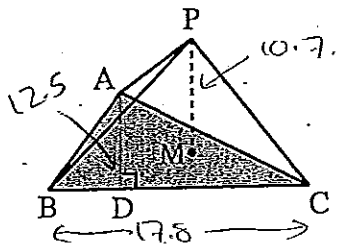


$V = \frac{1}{3} \times (23.8 \times 9.6) \times 10.2$

$= 776.83 cm^3$ ✓

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

a

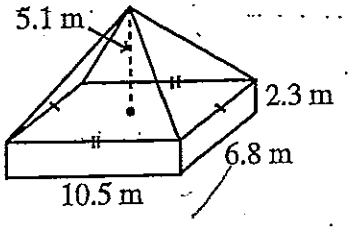


BC = 17.8 cm
AD = 12.5 cm
PM = 10.7 cm

$V = \frac{1}{3} \times (\frac{1}{2} \times 17.8 \times 12.5) \times 10.7$

$= 396.8 cm^3$ ✓

b



$V = \frac{1}{3} \times (10.5 \times 6.8) \times 5.1 + 10.5 \times 6.8 \times 2.3 = 285.6 m^3$ ✓

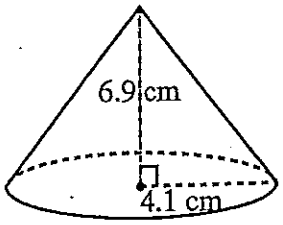
Surface area and volume

UNIT 7: Volume of a cone

$V = \frac{1}{3} \times A \times h$.

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

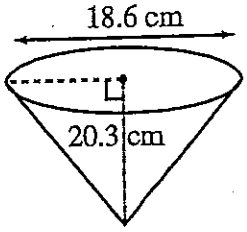
a



$V = \frac{1}{3} \times (\pi \times 4.1^2) \times 6.9$

$= 121.5 cm^3$

b

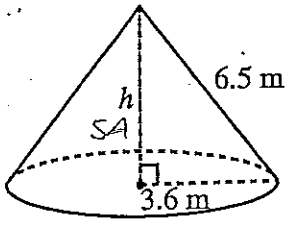


$V = \frac{1}{3} \times (\pi \times 9.3^2) \times 20.3$

$= 1838.6 cm^3$

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

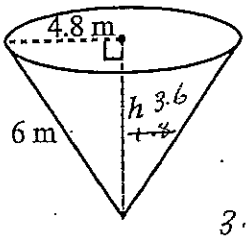
a



$V = \frac{1}{3} \times (\pi \times 3.6^2) \times 5.4$

$= 73.45 cm^3$

b



$V = \frac{1}{3} \times (\pi \times 4.8^2) \times 3.6$

$= 86.86 cm^3$.

QUESTION 3

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

$V = \frac{1}{3} \times (\pi \times 8^2) \times 15 = 1005.31 cm^3$

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

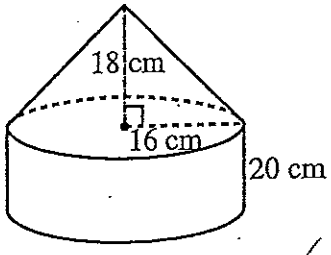
$V = \frac{1}{3} \times (\pi \times 2.6^2) \times 7.9 = 55.92 cm^3$

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

$V = \frac{1}{3} \times (\pi \times 15^2) \times 20 = 4712.39 cm^3$

QUESTION 4 Find the volume of the following solids.

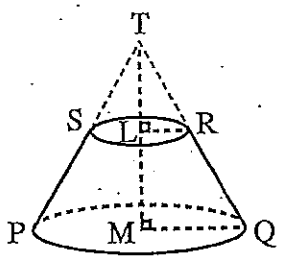
a



$V = \frac{1}{3} \times (\pi \times 16^2) \times 18 + \pi \times 16^2 \times 20$

$= 20910.4 cm^3$

b



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

$\frac{1}{3} \times (\pi \times 9^2) \times 18 - \frac{1}{3} \times (\pi \times 9^2) \times 8$

$= 1392.8 cm^3$

Surface area and volume

UNIT 8: Volume of a sphere

$\frac{4}{3}\pi r^3$

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

a radius = 9 cm

$\frac{4}{3} \times \pi \times 9^3$ ✓

$= 3053.6 cm^3$

b diameter = 20 cm

$\frac{4}{3} \times \pi \times 10^3$ ✓

$= 4188.8 cm^3$

c radius = 30 cm ✓

$\frac{4}{3} \times \pi \times 30^3$

$= 113097.3 cm^3$

d diameter = 35 cm

$\frac{4}{3} \times \pi \times 17.5^3$ ✓

$= 22449.3 cm^3$

e radius = 15.3 cm ✓

$\frac{4}{3} \times \pi \times 15.3^3$

$= 15002.5 cm^3$

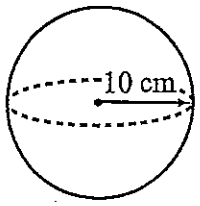
f diameter = 56 cm

$\frac{4}{3} \times \pi \times 28^3$

$= 91952.3 cm^3$

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

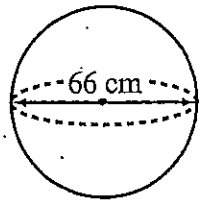
a



$\frac{4}{3} \times \pi \times 10^3$ ✓

$= 4188.8 cm^3$ ✓

b

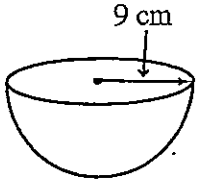


$\frac{4}{3} \times \pi \times 33^3$ ✓

$= 150532.6 cm^3$ ✓

QUESTION 3 Calculate the volume of the following hemispheres correct to one decimal place.

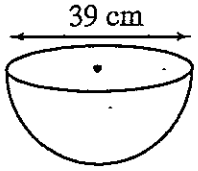
a



$\frac{2}{3} \times \pi \times 9^3$ ✓

$= 1526.8 cm^3$ ✓

b



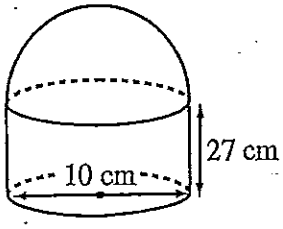
$\frac{2}{3} \times \pi \times 19.5^3$

~~$= 53577 3.6 cm^3$~~

$15529.7 cm^3$

QUESTION 4 Find the volume of the following solids correct to two decimal places.

a

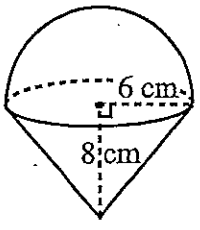


$\pi r^2 h + \frac{2}{3}\pi r^3$ ✓

$\pi \times 5^2 \times 27 + \frac{2}{3} \times \pi \times 5^3$

$= 2382.37 cm^3$ ✓

b



$\frac{1}{3}Ah + \frac{2}{3}\pi r^3$

$\frac{1}{3} \times (\pi \times 6^2) \times 8 + \frac{2}{3}\pi \times 6$

$= 753.98 cm^3$ ✓

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.

$SA = 4\pi r^2$ ✓

$= 4 \times \pi \times 6400^2$ ✓

$= 514718540.4 km^2$ ✓

b the volume correct to four significant figure

$V = \frac{4}{3}\pi r^3$

$= \frac{4}{3} \times \pi \times 6400^3$ ✗

$= 1.10 \times 10^{12} km^3$

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

a its surface area correct to one decimal place.

$SA = 4\pi r^2$ ✓

$= 4 \times \pi \times 4.56^2$

$= 261.3 m^2$ ✓

b its volume correct to two decimal places.

$V = \frac{4}{3}\pi r^3$ ✓

$= \frac{4}{3} \times \pi \times 4.56^3$

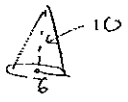
$= 397.18 m^3$ ✓

QUESTION 3 A conical tent has a base diameter of 6.5 metres and a slant height of 6 metres. Find th area of canvas used for this tent. $SA = \pi rl$

$\pi \times 3.25 \times 6$ ✓

$= 61.26 m^2$ ✓

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.

$V = \frac{1}{3} \times \pi r^2 \times 10$

$= \frac{1}{3} \times \pi \times 6^2 \times 10$ ✓

$= 376.99...$ ✓

$= 377 cm^3$ ✓

b its capacity to the nearest millilitre.

377mL ✓

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.

$6 \times 2.5 \times 2 = 30$

$25 \times 2.5 \times 2 = 125$ ✓

$25 \times 6 = 150$ ✓

$305 \times 46 = \$14030$

b its capacity to the nearest litre.

$25 \times 6 \times 2.5 = 375$ ✓

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.

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

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

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

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

Ⓐ 27 cm³ Ⓑ 963 cm³ Ⓒ 693 cm³ Ⓓ 396cm³

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

Ⓐ 5 cm Ⓑ 15 cm Ⓒ 25 cm Ⓓ 35 cm

5 How many square centimetres are in a square metre?

Ⓐ 100 Ⓑ 1000 Ⓒ 10 000 Ⓓ 100 000

6 A cone has a base diameter of 12 cm and a vertical height of 8 cm. Calculate its volume. $V = \frac{1}{3}\pi r^2 h$ $\frac{1}{3} \times \pi \times 6^2 \times 8 = 96\pi$

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

7 The volume of a sphere of radius 5 cm is closest to $\frac{4}{3} \times \pi \times 5^3$

Ⓐ 515 cm³ Ⓑ 524 cm³ Ⓒ 864 cm³ Ⓓ 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?

Ⓐ 19 Ⓑ 190 Ⓒ 1900 Ⓓ 19 000

9 The volume of a cone with diameter 7 cm and height 8 cm is closest to $\frac{1}{3} \times \pi \times 3.5^2 \times 8$

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

10 The volume of a cylinder with diameter 5 m and height 4 m is closest to $\pi r^2 h$ $\pi \times 2.5^2 \times 4$

Ⓐ 57 m³ Ⓑ 69 m³ Ⓒ 79 m³ Ⓓ 89 m³

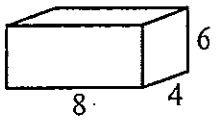
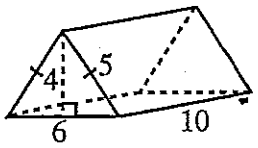
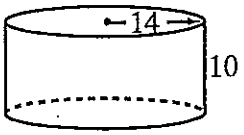
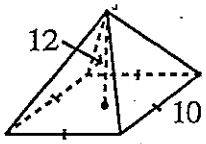
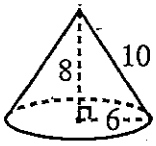
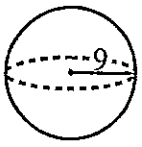
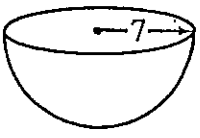
Total marks achieved for SECTION 1

39

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 =	208 ~~240~~ cm^2	2
	2 Volume =	192 cm^3 ✓	2
	**3** Surface area = $\frac{1}{2} \times 6 \times 4 =$	2 ~~17~~ cm^2	2
	4 Volume =	120 cm^3 ✓	2
	**5** Surface area = $2\pi r^2 + 2\pi rh$ $2 \times \pi \times 14^2 + 2 \times \pi \times 14 \times 10$	672π cm^2 ✓	2
	6 Volume = $\pi r^2 h$ $\pi \times 14^2 \times 10$	1960π cm^3 ✓	2
	**7** Surface area = $\frac{1}{2} \times 10 \times 12 \times 4 + 10^2$	6 ~~340~~ cm^2	2
	8 Volume = $V = \frac{1}{3}Ah$	400 cm^3 ✓	2
	**9** Surface area = $\pi r^2 + \pi rl$	96π cm^2 ✓	2
	10 Volume = $\frac{1}{3}Ah$	96π cm^3 ✓	2
	**11** Surface area = $4\pi r^2$	324π cm^2 ✓	2
	12 Volume = $\frac{4}{3}\pi r^3$	~~927~~ 972π cm^3 ✗	2
	**13** Surface area = $2\pi r^2 + \pi r^2$	147π cm^2 ✓	2
	14 Volume = $\frac{2}{3}\pi r^3$	$\frac{686\pi}{3}$ cm^3 ✓	2
15 Find the surface area of a sphere with radius equal to 14 cm. $4 \times \pi \times 14^2 =$		784π cm^2 ✓	2

Total marks achieved for SECTION 2 26/30

Answers

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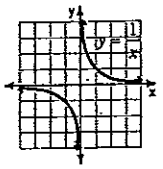
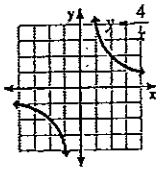
1 a

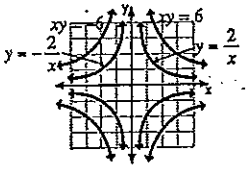
x	−4	−2	−1	−0.5	0	0.5	1	2	4
$y=\frac{1}{x}$	$-\frac{1}{4}$	$-\frac{1}{2}$	−1	−2	–	2	1	$\frac{1}{2}$	$\frac{1}{4}$

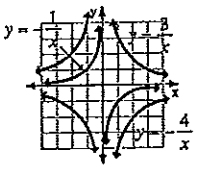


b

x	−4	−2	−1	−0.5	0	0.5	1	2	4
$y=\frac{4}{x}$	−1	−2	−4	−8	–	8	4	2	1



2 

3 

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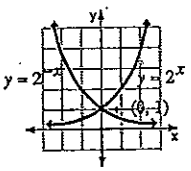
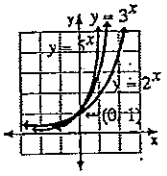
1 a

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

b

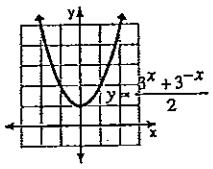
x	−3	−2	−1	0	1	2	3
$y=2^{-x}$	8	4	2	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$



2 

3

x	−1	0	1	2	3
3^x	$\frac{1}{3}$	1	3	9	27
3^{-x}	3	1	$\frac{1}{3}$	$\frac{1}{9}$	$\frac{1}{27}$
$\frac{3^x+3^{-x}}{2}$	1.7	1	1.7	4.6	13.5



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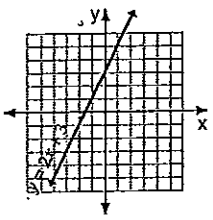
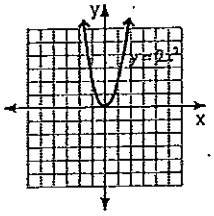
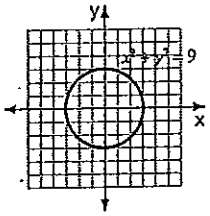
1 a straight line b hyperbola c straight line d parabola e parabola f exponential g parabola h hyperbola i none of thes
j circle k exponential l circle 2 a D b H c F d G e I f C g A h B i E j L k J l K

3 a 

b 

c 

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

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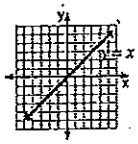
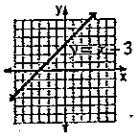
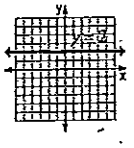
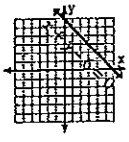
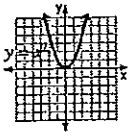
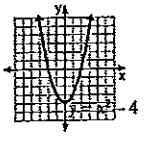
1 

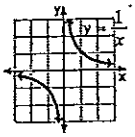
2 

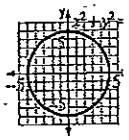
3 

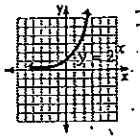
4 

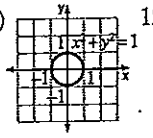
5 

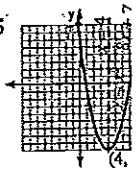
6 

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 

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1 a 636 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

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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

Page 32

1 a 301.6 cm² b 364 cm² 2 a ~~452.4~~ 339.3 cm² b 731.3 cm² 3 a 264π cm² b 576π cm² c 1932π cm² 4 a 180π cm² b 761.2 c

Page 33

1 a 196π cm² b 324π cm² c 3136π cm² d ~~7056~~ 1764 π cm² e 865.7 cm² f 1794.5 cm² 2 a 576π cm² b 1764π cm² 3 a 461.81 c
b 1847.26 cm² 4 a 1260 cm² b 2890 cm² c 104 cm² 5 5.35 cm

Page 34

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 c
4 a 1170 m³ b 2470 m³ c $24\,696\pi$ cm³