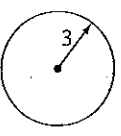
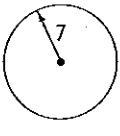
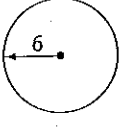
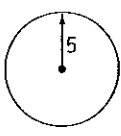
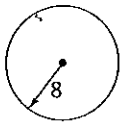
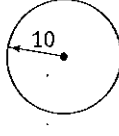
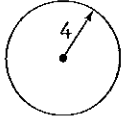
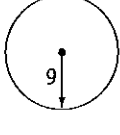
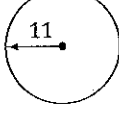
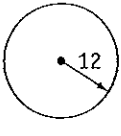
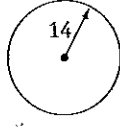
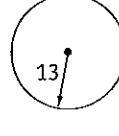


Circumference of a circle when radius is given

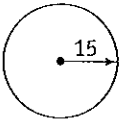
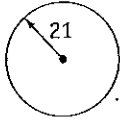
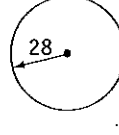
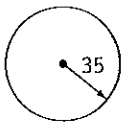
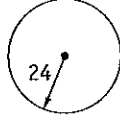
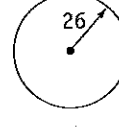
QUESTION 1 Calculate the circumference of each circle using $\pi = \frac{22}{7}$ (All measurements are in cm.)

<p>a  _____ _____</p>	<p>b  _____ _____</p>	<p>c  _____ _____</p>
<p>d  _____ _____</p>	<p>e  _____ _____</p>	<p>f  _____ _____</p>

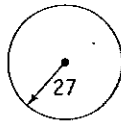
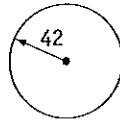
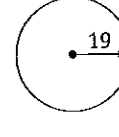
QUESTION 2 Calculate the circumference of the following circles correct to 2 decimal places. Use the calculator for the value of π . (All measurements are in cm.)

<p>a  _____ _____</p>	<p>b  _____ _____</p>	<p>c  _____ _____</p>
<p>d  _____ _____</p>	<p>e  _____ _____</p>	<p>f  _____ _____</p>

QUESTION 3 Calculate the circumference of each circle using $\pi = 3.14$, giving answers correct to 3 significant figures. (All measurements are in cm.)

<p>a  _____ _____</p>	<p>b  _____ _____</p>	<p>c  _____ _____</p>
<p>d  _____ _____</p>	<p>e  _____ _____</p>	<p>f  _____ _____</p>

QUESTION 4 Calculate the perimeter of each figure correct to 2 decimal places.

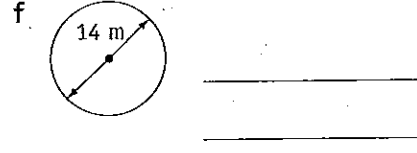
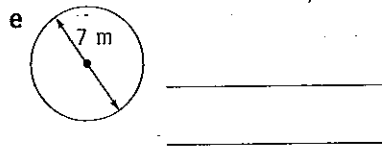
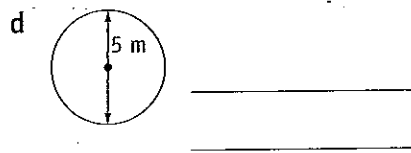
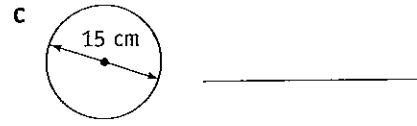
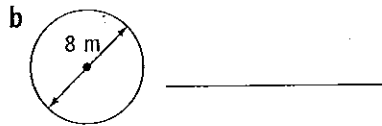
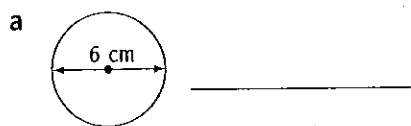
<p>a  _____ _____</p>	<p>b  _____ _____</p>	<p>c  _____ _____</p>
--	--	--

Circles and cylinders

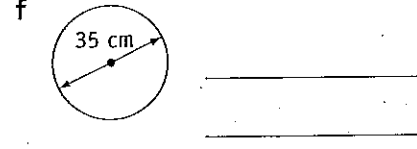
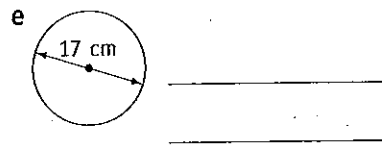
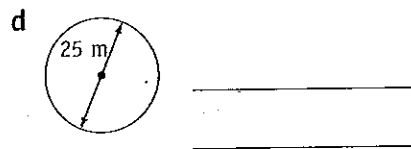
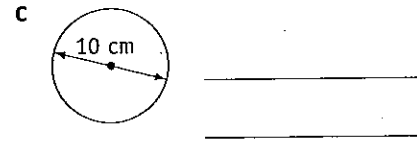
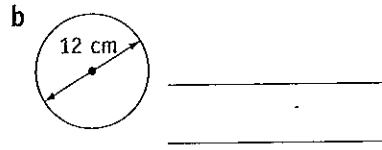
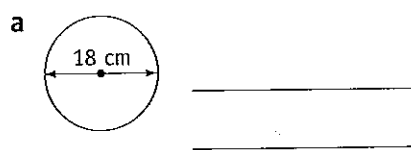


Circumference of a circle when diameter is given

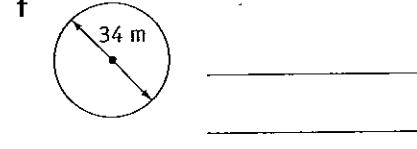
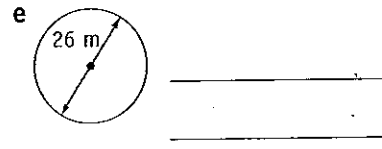
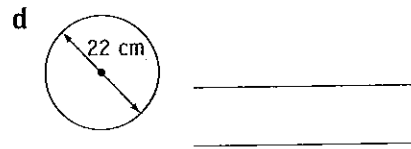
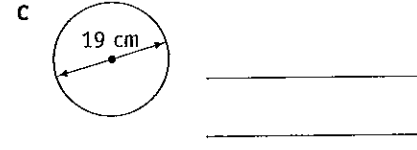
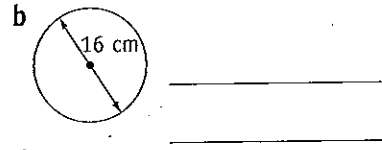
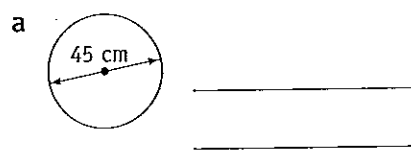
QUESTION 1 Calculate the circumference of the following circles using $\pi = \frac{22}{7}$



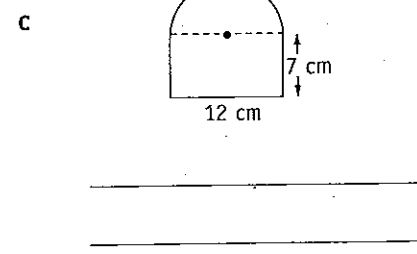
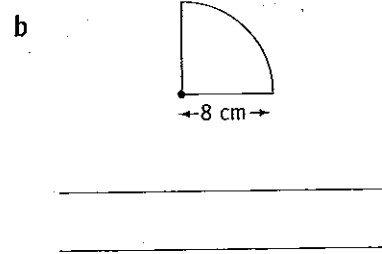
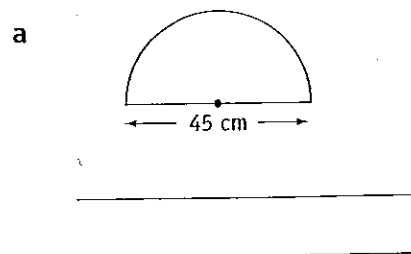
QUESTION 2 Calculate the circumference of the following circles correct to 2 decimal places using the calculator value of π .



QUESTION 3 Calculate the circumference of these circles using $\pi = 3.14$. Give your answers correct to 3 significant figures.



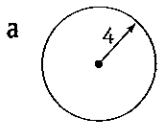
QUESTION 4 Calculate the perimeter of these figures correct to 1 decimal place.

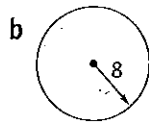


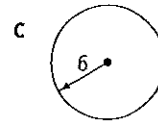
Circles and cylinders

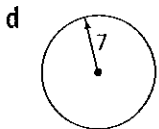
Area of a circle when radius is given

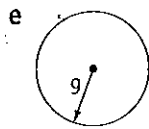
QUESTION 1 Calculate the area of these circles using $\pi = \frac{22}{7}$ (All measurements are in cm.)

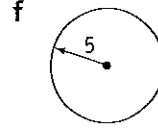




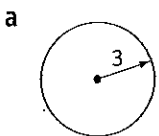


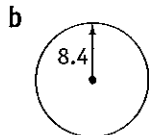


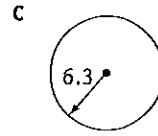


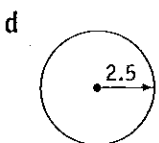


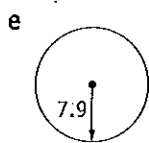
QUESTION 2 Calculate the area of each circles correct to 2 decimal places using the calculator value of π . (All measurements are in cm.)

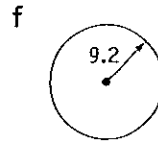




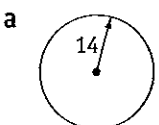


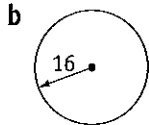


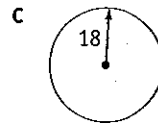


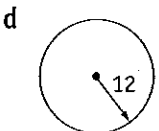


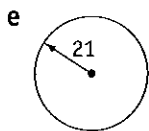
QUESTION 3 Calculate the area of these circles correct to 3 significant figures using $\pi = 3.14$ (All measurements are in cm.)

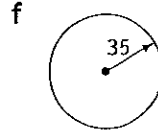






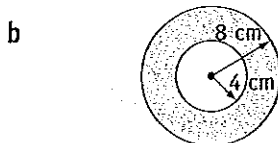


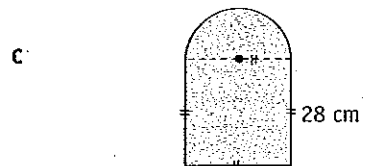




QUESTION 4 Calculate the shaded area correct to 1 decimal place.



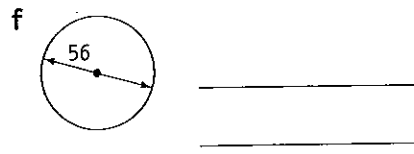
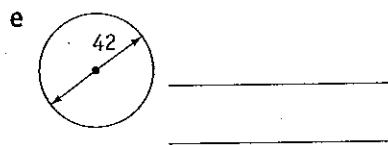
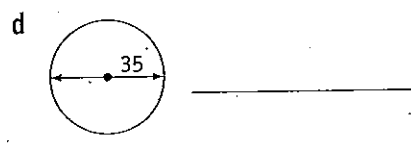
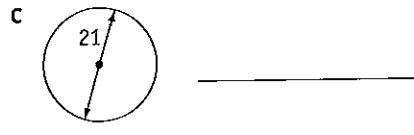
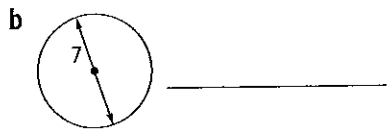
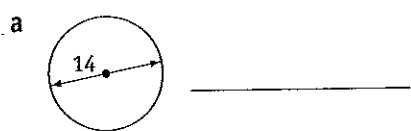




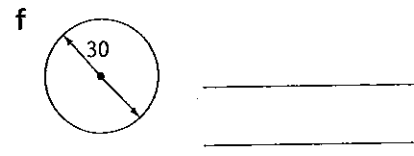
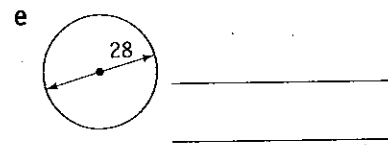
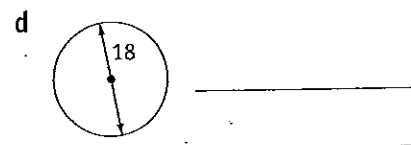
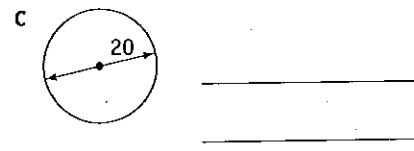
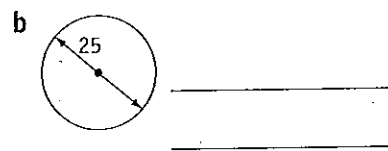
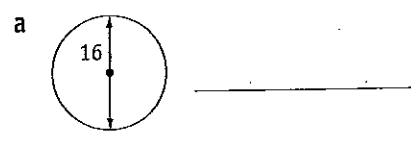
Circles and cylinders

Area of a circle when diameter is given

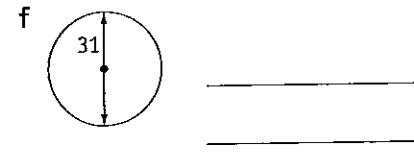
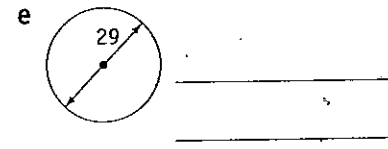
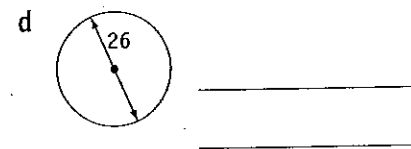
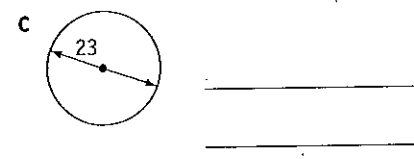
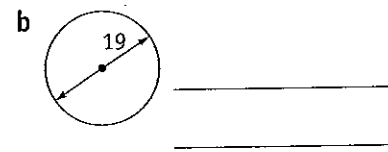
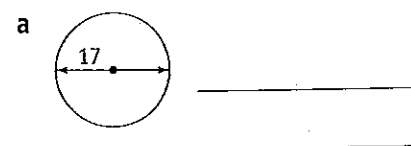
QUESTION 1 Calculate the area of these circles using $\pi = \frac{22}{7}$ (All measurements are in m.)



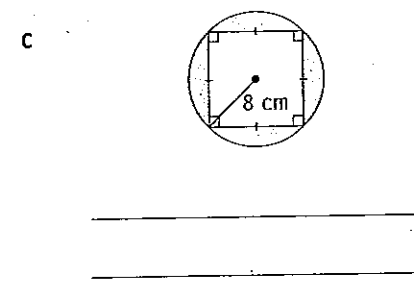
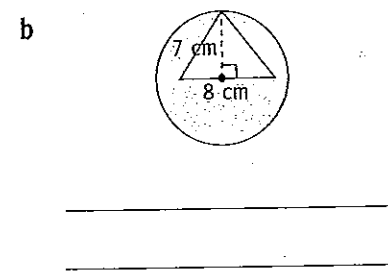
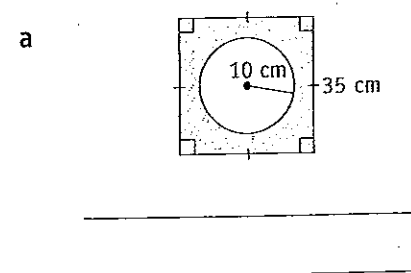
QUESTION 2 Find the area of each circle correct to 2 decimal places using the calculator value of π . (All measurements are in cm.)



QUESTION 3 Calculate the area of these circles correct to 3 significant figures using $\pi = 3.14$ (All measurements are in cm.)

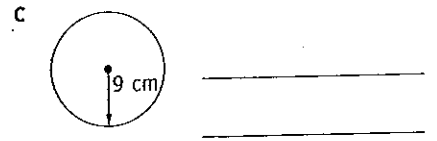
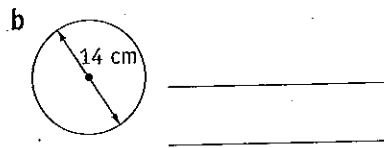
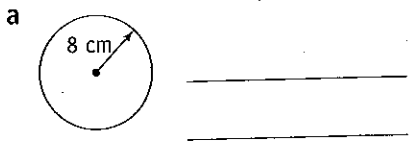


QUESTION 4 Calculate the shaded area correct to 1 decimal place.

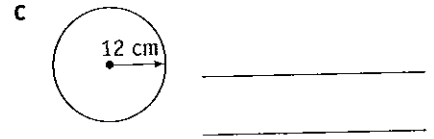
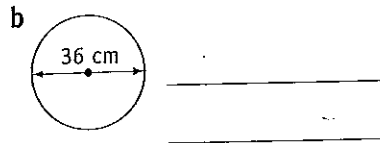
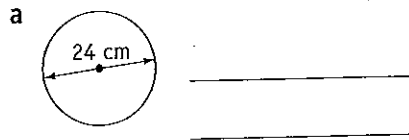


Miscellaneous questions

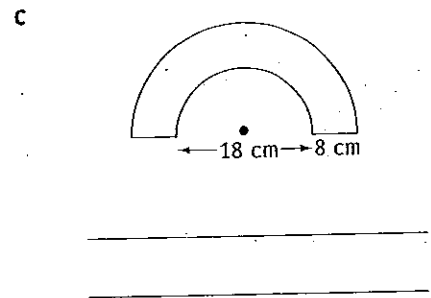
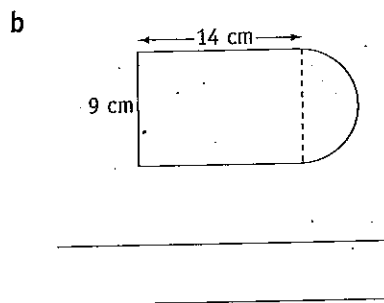
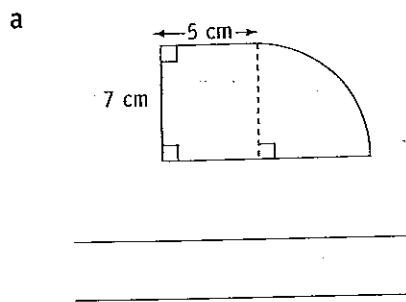
QUESTION 1 Calculate the circumference correct to 2 decimal places.



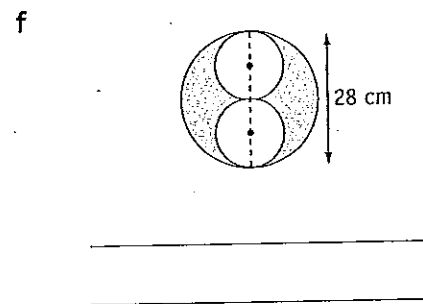
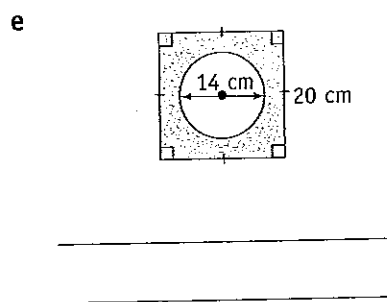
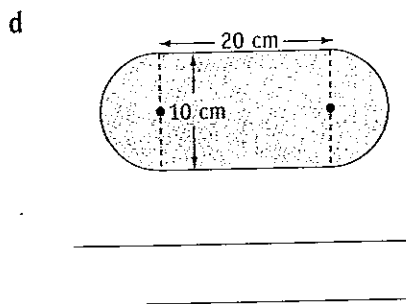
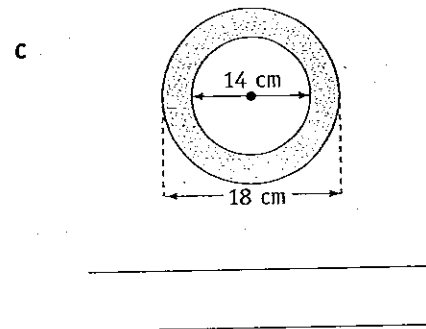
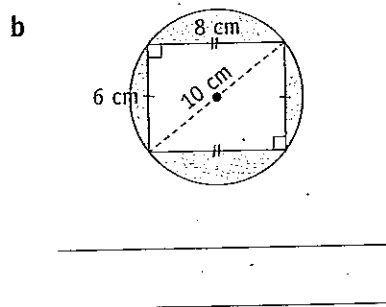
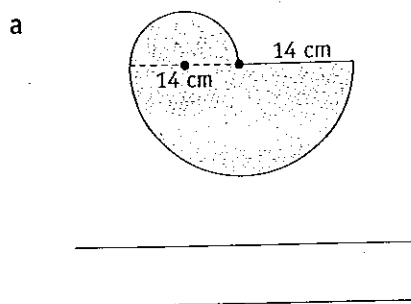
QUESTION 2 Calculate the area correct to 1 decimal place.



QUESTION 3 Calculate the perimeter of each shape correct to 3 significant figures.



QUESTION 4 Calculate the shaded area correct to 2 decimal places.

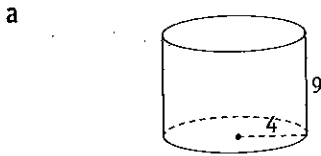


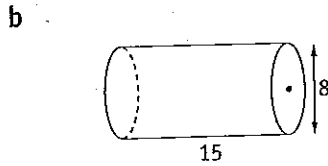
Circles and cylinders

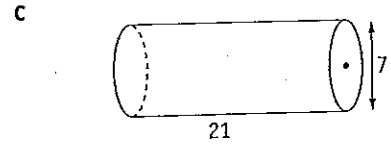


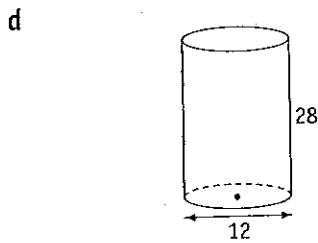
Volume of a cylinder

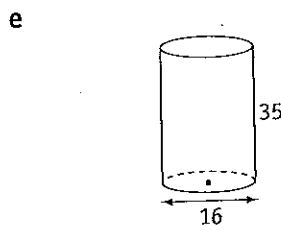
QUESTION 1 Calculate the volume of each cylinder correct to 1 decimal place.
(All measurements are in cm.)

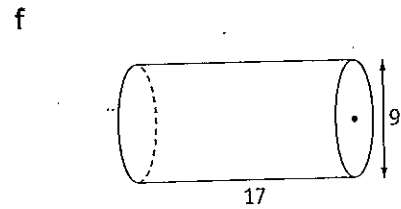




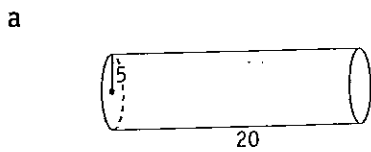


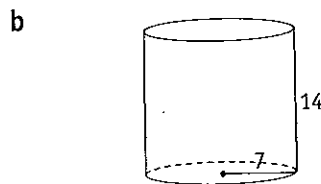


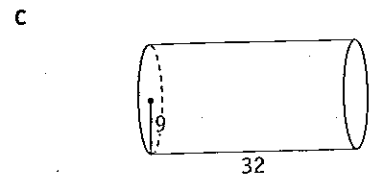




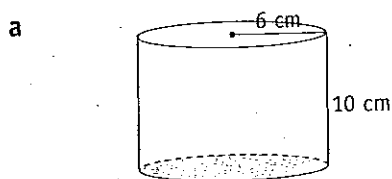
QUESTION 2 Calculate the volume of each cylinder correct to 2 decimal places.
(All measurements are in cm.)

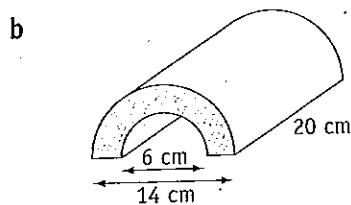


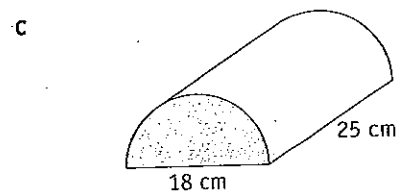




QUESTION 3 Calculate the volume of each solid, giving your answer to the nearest cm^3 .



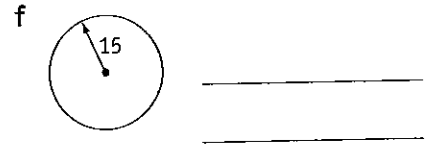
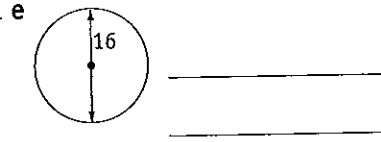
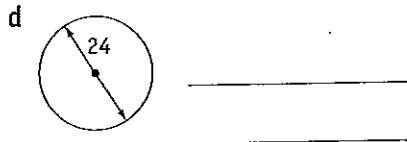
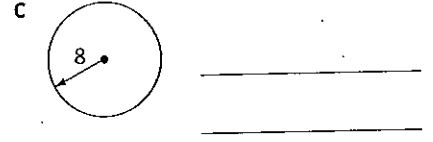
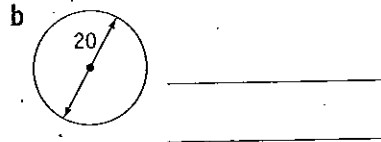
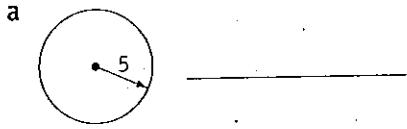




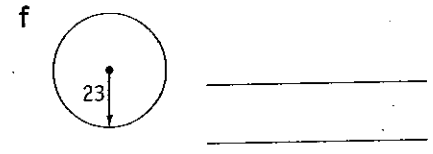
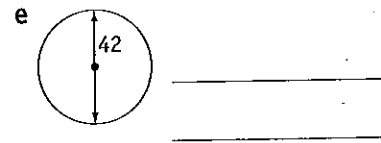
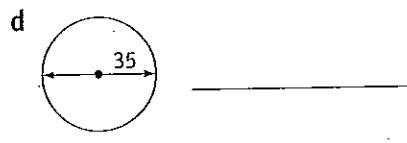
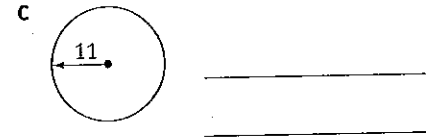
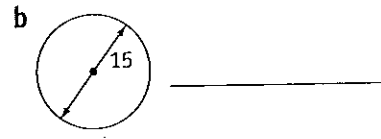
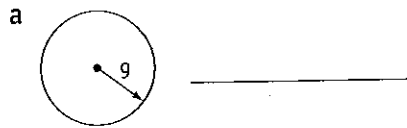
Circles and cylinders

Mixed questions

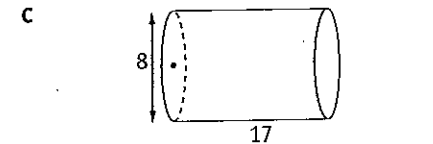
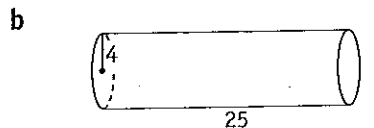
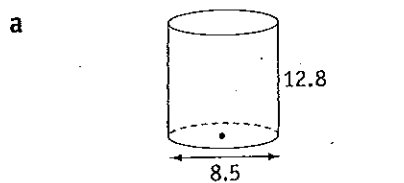
QUESTION 1 Find the circumference of these circles correct to 2 decimal places.
(All measurements are in cm.)



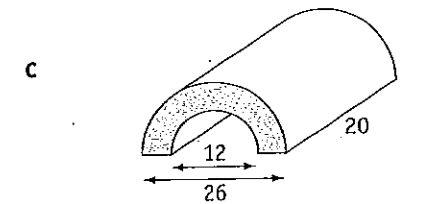
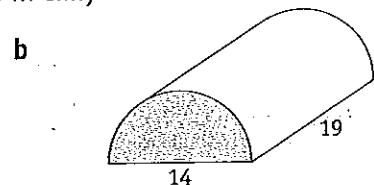
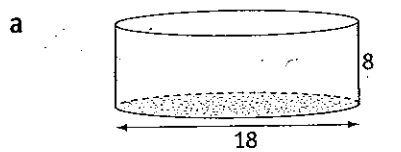
QUESTION 2 Calculate the area of each circle correct to 1 decimal place. (All measurements are in cm.)



QUESTION 3 Calculate the volume of each cylinder correct to 1 decimal place.
(All measurements are in cm.)



QUESTION 4 Find the volume of each solid, giving your answer to the nearest cm^3 .
(All measurements are in cm.)



Circles and cylinders

Problem solving with circles and cylinders

- 1 Calculate the circumference of a circle with radius 63 cm. (Use $\pi = \frac{22}{7}$)

- 2 Calculate the diameter of a circle with a circumference 572 cm. (Use $\pi = \frac{22}{7}$)

- 3 A circular track has radius 42 m. Calculate the distance around the track. (Use $\pi = \frac{22}{7}$)

- 4 Calculate the area of the circle formed by the track in Question 3. (Use $\pi = \frac{22}{7}$)

- 5 Find the volume of a can with diameter 27 cm and height 20 cm.

- 6 The circumference of a circle is 308 cm. Find the area of the circle. (Use $\pi = \frac{22}{7}$)

- 7 Find the area of a round tablecloth if its diameter is 5 metres. (Use $\pi = 3.14$)

- 8 A circular ring has a radius of 2.8 metres. What is the perimeter of the ring?

- 9 What is the cooking area of a circular barbeque grill having radius 14 cm?

- 10 What distance do you ride in one turn of a merry-go-round when you sit 8.5 metres from the centre?

- 11 Find the circumference of a circle with diameter 64 cm.

- 12 Find the area of a circle of radius 9 cm.

Circles and cylinders

TOPIC TEST

PART A

- Instructions**
- This part consists of 15 multiple choice questions
 - Fill in only ONE CIRCLE for each question
 - Each question is worth 1 mark
 - Calculators may be used

Time allowed: 15 minutes

Total marks = 15

	Marks
<p>1 The diameter and radius of a circle are related as</p> <p>(A) $r = 2d$ (B) $rd = 2$ (C) $d = 2r$ (D) none of these</p>	1
<p>2 The exact value of π is</p> <p>(A) 3.14 (B) 3.142 (C) $\frac{22}{7}$ (D) none of these</p>	1
<p>3 The circumference of a circle is given by the formula</p> <p>(A) $\frac{2\pi}{r}$ (B) $\frac{2\pi}{d}$ (C) $2\pi r$ (D) $2\pi d$</p>	1
<p>4 The area of a circle is given by the formula</p> <p>(A) πr^2 (B) πd^2 (C) $\frac{\pi}{r^2}$ (D) $\frac{\pi}{d^2}$</p>	1
<p>5 The volume of a cylinder with radius r and height h equals</p> <p>(A) $\pi r^2 h$ (B) $\pi r h^2$ (C) $\pi^2 r h$ (D) $\pi r h$</p>	1
<p>6 A semi-circle equals</p> <p>(A) a full circle (B) half a circle (C) a quarter of a circle (D) a third of a circle</p>	1
<p>7 A chord cuts the circle at</p> <p>(A) 1 point (B) 2 points (C) 3 points (D) no point</p>	1
<p>8 A tangent cuts the circle at</p> <p>(A) 1 point (B) 2 points (C) 3 points (D) no point</p>	1
<p>9 A quadrant is</p> <p>(A) $\frac{3}{4}$ of a circle (B) $\frac{1}{2}$ of a circle (C) $\frac{1}{4}$ of a circle (D) none of these</p>	1

10 The circumference of a circle with diameter 14 cm equals

- (A) 46 cm (B) 48 cm (C) 44 cm (D) 42 cm

Marks

1

11 The area of a circle with radius 14 cm equals

- (A) 610 cm² (B) 616 cm² (C) 622 cm² (D) none of these

1

12 The diameter of a circle is 24 cm. Its radius is

- (A) 6 cm (B) 8 cm (C) 12 cm (D) 16 cm

1

13 The area of a circle of radius 3 cm is approximately equal to


- (A) 27 cm² (B) 28 cm² (C) 29 cm² (D) none of these

1

14 $\frac{3}{4}$ of a circle is called a

- (A) semi-circle (B) quadrant (C) sector (D) segment

1

15  The shaded area in the figure is called a

- (A) semi-circle (B) segment (C) chord (D) sector

1

Total marks achieved for PART A

15

Answers

PAGE 64 1 a $x=8$ b $a=16$ c $y=21$ d $b=10$ e $m=20$ f $n=30$ g $k=35$ h $y=19$ i $t=22$ 2 a $p=18$
 b $x=23$ c $m=37$ d $n=6$ e $t=-3$ f $a=-5$ g $y=2$ h $x=31$ i $a=17$ j $x=14$ k $a=61$ l $m=-9$ 3 a $a=5$
 b $n=2$ c $x=35$ d $b=10$ e $p=15$ f $a=22$ g $m=27$ h $t=25$ i $y=34$ j $x=38$ k $a=32$ l $x=29$

PAGE 65 1 a $a=7$ b $x=21$ c $y=7$ d $a=24$ e $y=45$ f $x=-5$ g $m=9$ h $t=-42$ i $t=9$ 2 a $x=40$ b $x=-7$
 c $x=11$ d $x=12$ e $a=-27$ f $d=-25$ g $x=-4$ h $a=63$ i $x=11$ 3 a $a=7$ b $x=7$ c $p=-72$ d $y=-18$
 e $m=-24$ f $x=-6$ g $b=-25$ h $x=9$ i $t=-24$ j $y=84$ k $n=32$ l $x=-9$

PAGE 66 1 a $x=2$ b $x=3$ c $y=3$ d $m=10$ e $x=12$ f $a=9$ g $a=20$ h $x=6$ i $x=47$ 2 a $x=12$ b $y=5$
 c $k=7$ d $a=60$ e $p=5$ f $x=42$ g $a=2.12$ h $a=1$ i $b=0.9$ 3 a $x=5$ b $x=16$ c $x=37$ d $y=6$ e $y=-1$
 f $y=4$ g $t=3$ h $m=26$ i $x=9$ j $y=-6$ k $p=-7$ l $x=8$

PAGE 67 1 a $a=6$ b $x=-6$ c $a=2$ d $t=-15$ e $a=-4$ f $y=4$ g $y=4$ h $x=3$ i $m=2$ 2 a $x=15$ b $a=7$
 c $x=4$ d $a=1$ e $x=-2$ f $x=3$ g $m=4$ h $x=24$ i $x=-2$ 3 a $a=28$ b $x=6$ c $x=12$ d $y=-4$ e $m=16$
 f $x=-12$ g $y=8$ h $y=1$ i $y=12$ j $t=-39$ k $t=\frac{1}{3}$ l $x=-2$

PAGE 68 1 a $x=0$ b $a=3$ c $m=7$ d $a=3$ e $x=1$ f $a=10$ g $x=2$ h $m=2$ i $x=2\frac{2}{3}$ 2 a $a=18$ b $x=-10$
 c $t=3\frac{1}{2}$ d $x=4\frac{1}{2}$ e $a=-4$ f $x=3$ g $a=-32$ h $x=32$ i $x=31$ 3 a $x=-7$ b $x=13$ c $a=\frac{1}{2}$ d $a=2$
 e $a=12$ f $a=11$ g $m=17$ h $t=\frac{1}{2}$ i $a=2$

PAGE 69 1 a $x=1\frac{1}{2}$ b $a=1\frac{2}{3}$ c $y=2\frac{1}{2}$ d $a=18$ e $m=15$ f $x=84$ g $a=8$ h $x=15$ i $x=13$ 2 a $m=27$
 b $m=19$ c $x=31\frac{1}{2}$ d $m=28$ e $m=29$ f $a=10\frac{1}{3}$ g $p=11$ h $p=5$ i $x=8$ 3 a $x=10$ b $x=12$ c $p=3\frac{1}{2}$
 d $a=96$ e $p=18\frac{3}{4}$ f $a=4$ g $m=4\frac{1}{2}$ h $p=7\frac{1}{2}$ i $a=3$ j $a=17$ k $k=28$ l $m=102$

PAGE 70 1 a 24 b 35 c 60 d 40 e 54 f 65 g 63 h 112 i 84 2 a 32 b 48 c 42 d 54 e 20 f 80 g 190
 h $42\frac{1}{2}$ i 72 3 a 44 b 88 c 132 d 176 e 220 f 264 g $56\frac{4}{7}$ h $75\frac{3}{7}$ i $94\frac{2}{7}$ 4 a 154 b 616 c 1386 d 2464
 e $28\frac{2}{7}$ f $78\frac{4}{7}$ g $254\frac{4}{7}$ h $380\frac{2}{7}$ i $452\frac{4}{7}$ 5 a 40 b 24 c 48 d 40 e 50 f 36

PAGE 71 1 a 10 b 7 c 6 d 6 e 8 f 7 g 6 h 9 i 8 2 a 5 b 3 c 7 d 6 e 4 f 5 g 6 h 9 i 5
 3 a $\frac{7}{\pi}$ b $\frac{21}{\pi}$ c $\frac{39}{\pi}$ d $\frac{13}{\pi}$ e $\frac{27}{\pi}$ f $\frac{45}{\pi}$ g $\frac{19}{\pi}$ h $\frac{33}{\pi}$ i $\frac{47}{\pi}$ 4 a $\sqrt{\frac{10}{\pi}}$ b $\sqrt{\frac{28}{\pi}}$ c $\sqrt{\frac{57}{\pi}}$ d $\sqrt{\frac{15}{\pi}}$ e $\sqrt{\frac{32}{\pi}}$
 f $\sqrt{\frac{63}{\pi}}$ g $\sqrt{\frac{20}{\pi}}$ h $\sqrt{\frac{46}{\pi}}$ i $\sqrt{\frac{72}{\pi}}$ 5 a 17 b 20 c 18 d 28 e 30 f 30

PAGE 72 1 $x+8=15; x=7$ 2 $x-6=17; x=23$ 3 $2x=-10; x=-5$ 4 $\frac{x'}{5}=6; x=30$ 5 $x-7=12; x=19$ 6 $x+5=14;$
 $x=9$ 7 $x-4=3; x=7$ 8 $5x=-8; x=-\frac{8}{5}$ 9 $2x=18; x=9$ 10 $3x-8=16; x=8$ 11 $\frac{x}{5}-3=8; x=55$ 12 $2x+24=36;$
 $x=6$ 13 $3x=48; x=16$ 14 $4x+14=38; x=6$ 15 $3(x+5)-8=37; x=10$

PAGES 73 & 74 1 B 2 D 3 C 4 D 5 C 6 A 7 B 8 C 9 A 10 A 11 B 12 B 13 D 14 D 15 A

PAGE 75 1 $x=-8$ 2 $y=27$ 3 $m=3\frac{1}{2}$ 4 $x=-2$ 5 $x=-2$ 6 $a=30$ 7 $x=-23$ 8 $a=4$ 9 $x=9$ 10 $x=7\frac{1}{2}$
 11 $x=6$ 12 $x=2\frac{3}{13}$ 13 $x=9\frac{3}{4}$ 14 $y=\frac{3}{4}$ 15 $a=7\frac{1}{2}$

PAGE 76 1 a $x=8$ b $x=-6$ c $p=45$ d $a=27$ e $x=3$ 2 a $m=\frac{1}{2}$ b $m=5$ c $b=2$ d $a=-1\frac{5}{9}$ e $x=18\frac{1}{2}$
 3 a $x<9$ b $y>7$ c $x<15$ d $x<2\frac{2}{3}$ e $x\leq 5\frac{1}{3}$ 4 a $x=\frac{3}{7}$ b $x=18$ c $x=-1$ d $x=1\frac{1}{5}$ e $x=2\frac{1}{4}$

PAGE 77 1 a centre b radius c diameter d arc e chord 2 a semi-circle b minor segment c major segment d sector
 e tangent f secant 3 a circumference b concentric circles c quadrant 4 a $\frac{1}{4}$ b $\frac{1}{2}$ c $\frac{3}{4}$ d $\frac{1}{6}$ 5 a 8 cm b 15 cm
 c $C=2\pi r$ d $A=\pi r^2$ e four

PAGE 78 1 All answers in cm. a $18\frac{6}{7}$ b 44 c $37\frac{5}{7}$ d $31\frac{3}{7}$ e $50\frac{2}{7}$ f $62\frac{6}{7}$ 2 All answers in cm. a 25.13 b 56.55
 c 69.12 d 75.40 e 87.96 f 81.68 3 All answers in cm. a 94.2 b 132 c 176 d 220 e 151 f 163 4 a 169.65 units
 b 263.89 units c 119.38 units

PAGE 79 1 a $18\frac{6}{7}$ cm b $25\frac{1}{7}$ m c $47\frac{1}{7}$ cm d $15\frac{5}{7}$ m e 22 m f 44 m 2 a 56.55 cm b 37.70 cm c 31.42 cm
 d 78.54 m e 53.41 cm f 109.96 cm 3 a 141 cm b 50.2 cm c 59.7 cm d 69.1 cm e 81.6 m f 107 m 4 a 115.7 cm
 b 28.6 cm c 44.8 cm

Answers

PAGE 80 All answers are in cm^2 . 1 a $50\frac{2}{7}$ b $201\frac{1}{7}$ c $113\frac{1}{7}$ d 154 e $254\frac{4}{7}$ f $78\frac{4}{7}$ 2 a 28.27 b 221.67 c 124.69 d 19.63 e 196.07 f 265.90 3 a 615 b 804 c 1020 d 452 e 1380 f 3850 4 a 115.5 b 150.8 c 1091.9

PAGE 81 1 a 154 m^2 b $38\frac{1}{2} \text{ m}^2$ c $346\frac{1}{2} \text{ m}^2$ d $962\frac{1}{2} \text{ m}^2$ e 1386 m^2 f 2464 m^2 2 a 201.06 cm^2 b 490.87 cm^2 c 314.16 cm^2 d 254.47 cm^2 e 615.75 cm^2 f 706.86 cm^2 3 a 227 cm^2 b 283 cm^2 c 415 cm^2 d 531 cm^2 e 660 cm^2 f 754 cm^2 4 a 910.8 cm^2 b 125.9 cm^2 c 73.1 cm^2

PAGE 82 1 a 50.27 cm b 43.98 cm c 56.55 cm 2 a 452.4 cm^2 b 1017.9 cm^2 c 452.4 cm^2 3 a 35.0 cm b 51.1 cm c 97.7 cm 4 a 384.85 cm^2 b 30.54 cm^2 c 100.53 cm^2 d 278.54 cm^2 e 246.06 cm^2 f 307.88 cm^2

PAGE 83 1 a 452.4 cm^3 b 754.0 cm^3 c 808.2 cm^3 d 3166.7 cm^3 e 7037.2 cm^3 f 1081.5 cm^3 2 a 392.70 cm^3 b 538.78 cm^3 c 2035.75 cm^3 3 a 1131 cm^3 b 1257 cm^3 c 3181 cm^3

PAGE 84 1 a 31.42 cm b 62.83 cm c 50.27 cm d 75.40 cm e 50.27 cm f 94.25 cm 2 a 254.5 cm^2 b 176.7 cm^2 c 380.1 cm^2 d 962.1 cm^2 e 1385.4 cm^2 f 1661.9 cm^2 3 a 726.3 cm^3 b 1256.6 cm^3 c 854.5 cm^3 4 a 2036 cm^3 b 1462 cm^3 c 4178 cm^3

PAGE 85 1 396 cm 2 182 cm 3 264 m 4 5544 m^2 5 11 451.1 cm^3 6 7546 cm^2 7 19.625 m^2 8 17.59 cm^2 9 615.75 cm^2 10 53.41 m 11 201.06 cm 12 254.47 cm^2

PAGES 86 & 87 1 C 2 D 3 C 4 A 5 A 6 B 7 B 8 A 9 C 10 C 11 B 12 C 13 B 14 C 15 B

PAGE 88 1 radius 2 sector 3 diameter 4 circumference 5 arc 6 chord 7 quadrant 8 minor segment 9 semi-circle 10 $A = \pi r^2$ 11 $C = 2\pi r$ 12 3.142 13 11.14 cm 14 251.33 cm^3 15 1385 cm^3

PAGE 89 1 a 62.83 cm; 314.16 cm^2 b 52.78 cm; 221.67 cm^2 c 31.42 cm 2 a 27.02 cm b 47.3 cm c 17.85 cm d 51.98 mm e 914.16 m 3 a 804.25 cm^2 b 3619.11 cm^3 c 3396.06 cm^2 4 a 457.06 cm^2 b 69.06 cm^2 c 56.55 cm^2

PAGE 90 1 a three b two c no d three e one f one 2 a equal b equal c 180° d 60° e opposite interior f 360° 3 a four-sided b many sides c parallel d parallel e equal f right angle 4 a equal, 90° b equal, parallel c 360° d equal e 90° 5 a equal b equal c equal d 180°

PAGE 91 1 a 36 b 75 c 143 d $x = 120, y = 60$ e 44 f 35 2 a $x = 75, y = 20$ (vertically opp. angles, straight angle) b 122 (straight angle) c 50 (straight angle) d 30 (straight angle) e 50 (vert. opp. angles) f 178 (angles at a point) 3 a $x = 54$ (vert. opp. angles) b $x = 20$ (straight angle) c $m = 112$ (straight angle)

PAGE 92 1 a $x = 110$ b $x = 35$ c $x = 65$ d $x = 65$ e $x = 120$ f $x = 89$ 2 a $x = 110$ (sum of angles) b $x = 54$ (complementary angles) c $m = 60$ (complementary angles, vert. opp. angles) 3 a $a = 70$ (straight angle) b $x = 25$ (straight angle) c $p = 35$ (complementary angles) d $x = 55$ (straight angle) e $x = 35$ (straight angle) f $x = 55$ (sum of angles)

PAGE 93 1 a $p = 115$ b $x = 70$ c $x = 115$ d $x = 69^\circ$ e $y = 82$ f $m = 70, n = 70$ 2 a $x = 93$ (co-interior angles) b $x = 66$ (alternate angles) c $m = 40$ (co-interior angles) 3 a $y = 143$ (straight angle, corresponding angles) b $t = 35$ (straight angle, corresponding angles) c $x = 130$ (corresponding angles) d $x = 110$ (co-interior angles) e $x = 30$ (alternate angles) f $x = 115, y = 65$ (straight angle, corresponding angles, alternate angles)

PAGE 94 1 a $x = 70$ b $x = 70$ c $y = 110$ d $y = 50$ e $x = 30$ f $x = 40$ 2 a $a = 20$ b $x = 30$ c $a = 20$ d $a = 18$ e $x = 40$ f $x = 48$ 3 a $y = 40$ b $a = 20$ c $x = 40$ d $m = 60$ e $x = 50$ f $x = 20$

PAGE 95 1 a $x = 167$ b $x = 58$ c $x = 86$ d $x = 255$ e $y = 65$ f $x = 67$ 2 a $y = 130$ b $y = 42$ c $a = 110, b = 58$ 3 a $x = 35$ b $x = 26$ c $x = 120$ d $x = 70, y = 20$ e $x = 55$ f $x = 55$

PAGE 96 1 a $x = 75, y = 65$ b $x = 70, y = 90$ c $x = 88, y = 88$ d $x = 40, y = 140$ e $y = 50$ f $x = 80$ 2 a $x = 52$ b $a = 55, b = 60, c = 60$ c $x = 50, y = 100$ 3 a $x = 72.5$ b $x = 120$ c $x = 30$ d $x = 102$ e $y = 75$ f $x = 125$

PAGE 97 1 teacher 2 teacher 3 teacher 4 teacher

PAGE 98 1 80° 2 80° 3 36° 4 49° 5 60° 6 45° 7 40° 8 $60^\circ, 120^\circ, 60^\circ$ 9 $30^\circ, 60^\circ, 90^\circ$ 10 $65^\circ, 115^\circ, 115^\circ$ 11 $18^\circ, 72^\circ, 90^\circ$ 12 30°

PAGES 99 & 100 1 C 2 B 3 A 4 B 5 D 6 C 7 A 8 A 9 B 10 A 11 A 12 C 13 B 14 C 15 D

PAGE 101 1 revolution 2 straight angle 3 obtuse angle 4 $x = 32$ 5 $x = 65$ 6 $x = 178$ 7 $x = 52$ 8 $x = 62$ 9 $x = 135$ 10 $a = 65$ 11 $m = 110$ 12 $p = 48$ 13 $x = 70$ 14 $x = 143, y = 75$ 15 $x = 134$

PAGE 102 1 a equal b 60° c 90° d four e parallel 2 a $a = 60$ b $x = 30$ c $x = 70$ d $a = 20$ e $x = 190$ 3 a $x = 300$ (angles at a point) b $x = 60, y = 120$ (supplementary angles) c $x = 60, y = 30$ (straight angle, vert. opp. angles) 4 a $a = 77$ (angles in quadrilateral) b $x = 100, y = 70$ (supplementary angles, alternate angles) c $x = 140, y = 30$ (straight angle, angles in a quadrilateral)