



MATHEMATICS



Unit 1

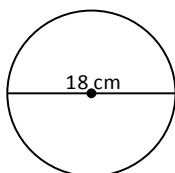
Expressions and Formulae
(Part 2 of 2)

The Circle

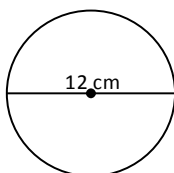
Exercise 1

Find the **circumference** ($C = \pi d$) of the following circles

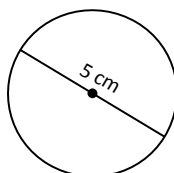
1)



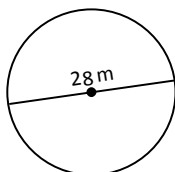
2)



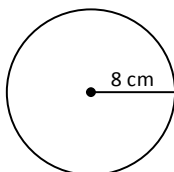
3)



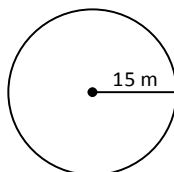
4)



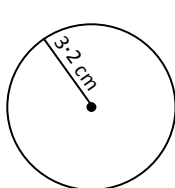
5)



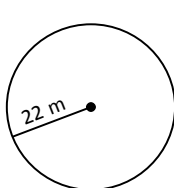
6)



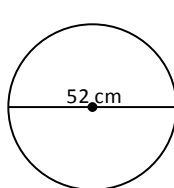
7)



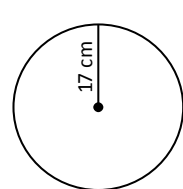
8)



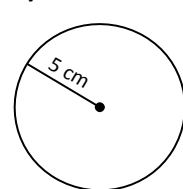
9)



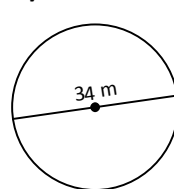
10)



11)



12)



Exercise 2

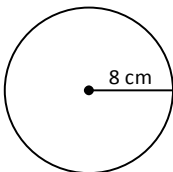
Find the **circumference** ($C = \pi d$) of the following circles

- | | | |
|---------------------|-----------------------|----------------------|
| 1) diameter = 2 m | 2) diameter = 20 m | 3) diameter = 54 cm |
| 4) diameter = 4.2 m | 5) diameter = 12.6 cm | 6) diameter = 6.3 cm |
| 7) radius = 2 cm | 8) radius = 6 m | 9) radius = 50 m |
| 10) radius = 3.2 cm | 11) radius = 8.4 m | 12) radius = 12.6 cm |

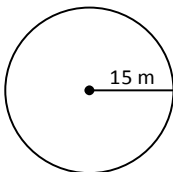
Exercise 3

Find the **area** ($A = \pi r^2$) of the following circles

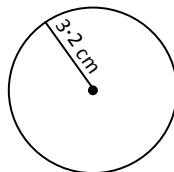
1)



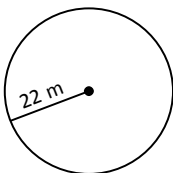
2)



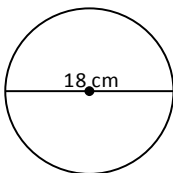
3)



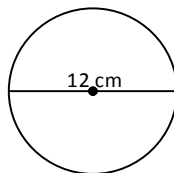
4)



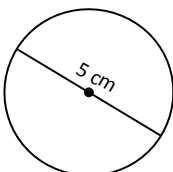
5)



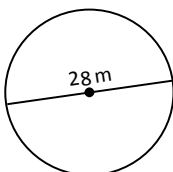
6)



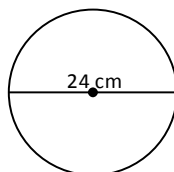
7)



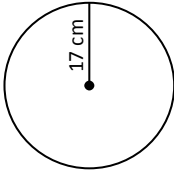
8)



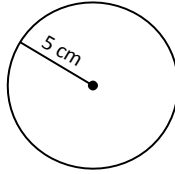
9)



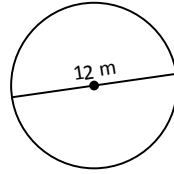
10)



11)



12)



Exercise 4

Find the **area** ($A = \pi r^2$) of the following circles

1) radius = 2 m

2) radius = 10 m

3) radius = 14 cm

4) radius = 4.2 m

5) diameter = 8 cm

6) diameter = 10 cm

7) diameter = 20 cm

8) diameter = 6 m

9) radius = 50 m

10) radius = 3.2 cm

11) diameter = 8.4 m

12) radius = 12.6 cm

13) diameter = 28 m

14) diameter = 7.4 cm

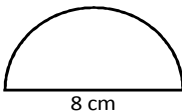
15) radius = 19 m

16) diameter = 264 cm

Exercise 5

Find the **area** of the following shapes

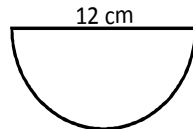
1)



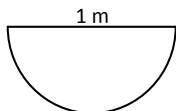
2)



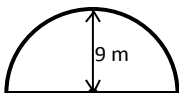
3)



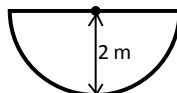
4)



5)



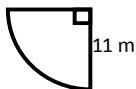
6)



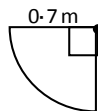
7)



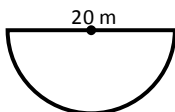
8)



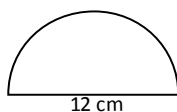
9)



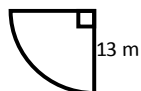
10)



11)



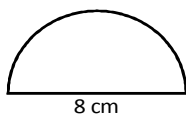
12)



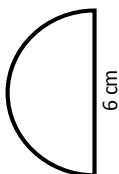
Exercise 6

Find the **perimeter** of the following shapes

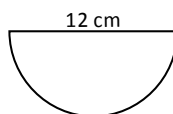
1)



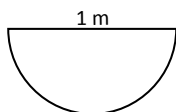
2)



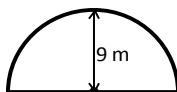
3)



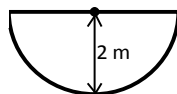
4)



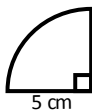
5)



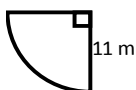
6)



7)



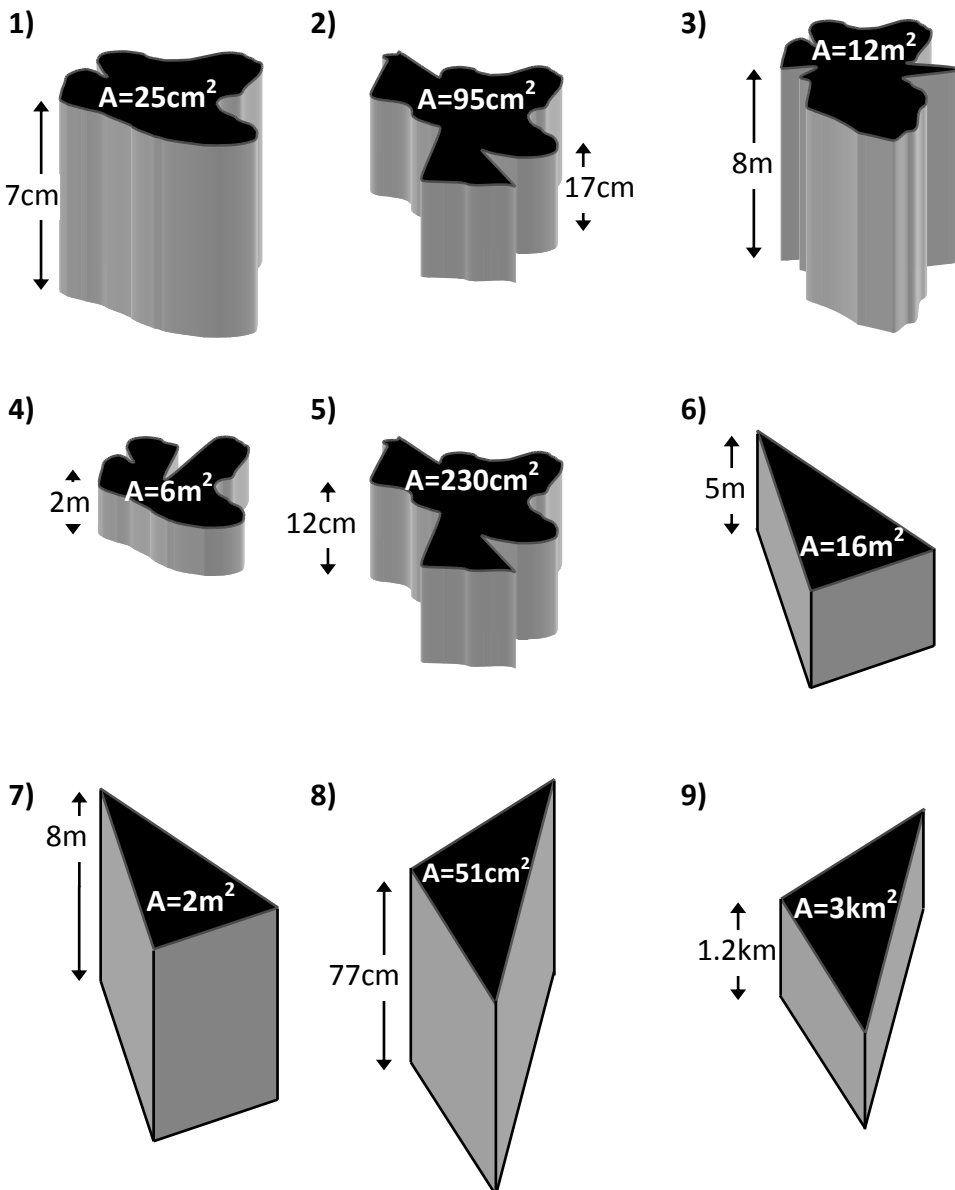
8)

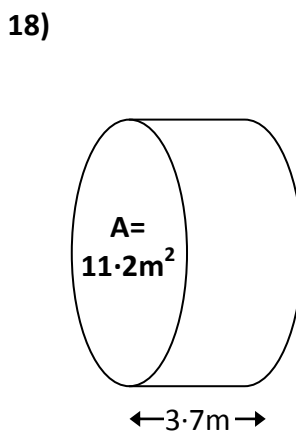
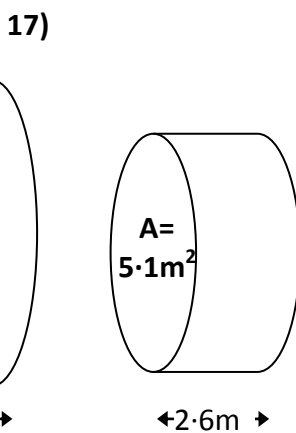
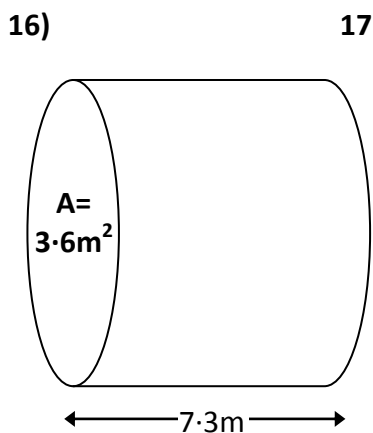
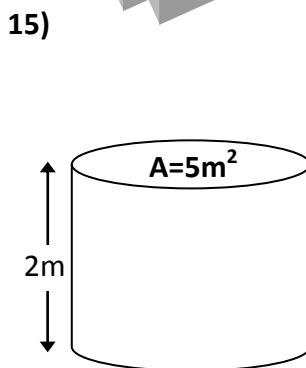
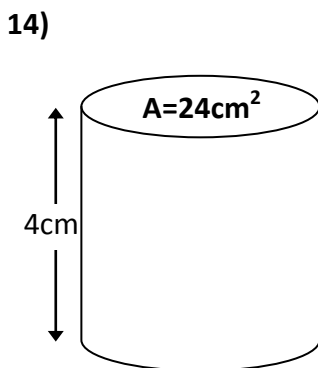
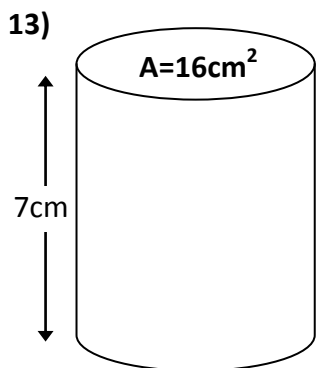
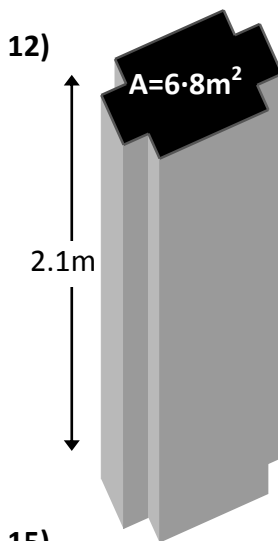
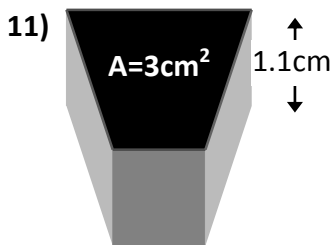
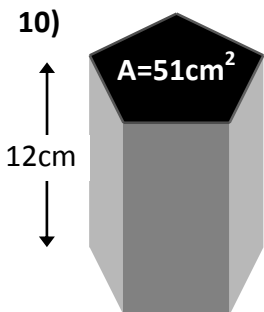


Volume

Exercise 1 (remember to include units in your answer: cm^3 , m^3 , km^3)

Work out the volume of the following prisms.

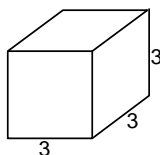




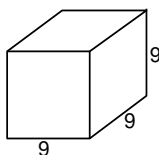
Exercise2

Calculate the volume of these shapes (all sizes in cm).

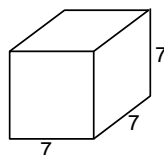
1)



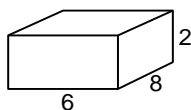
2)



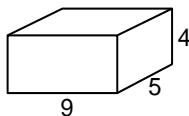
3)



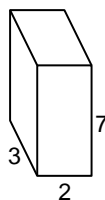
4)



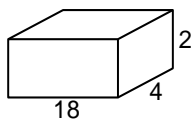
5)



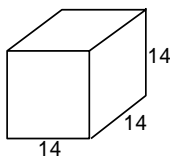
6)



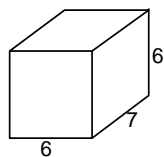
7)



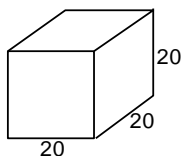
8)



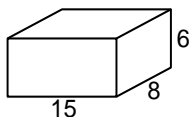
9)



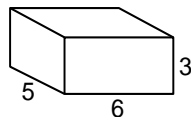
10)



11)

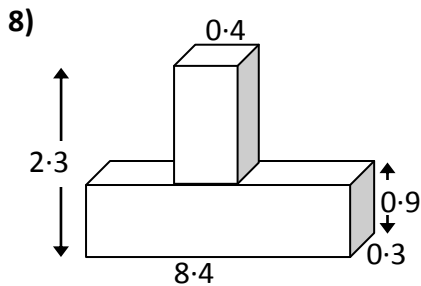
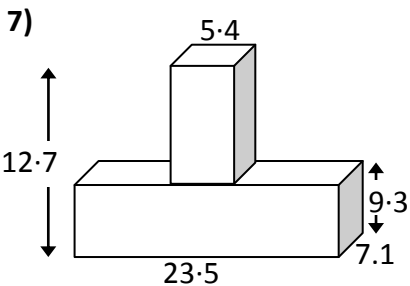
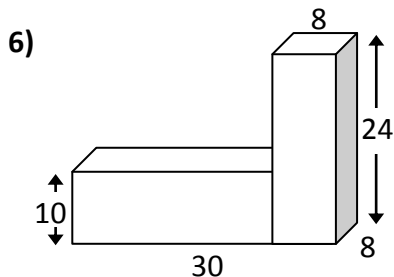
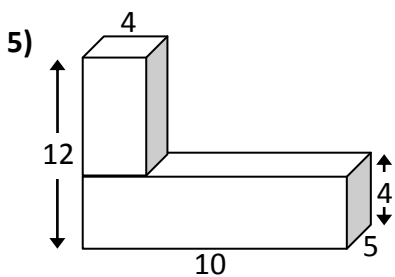
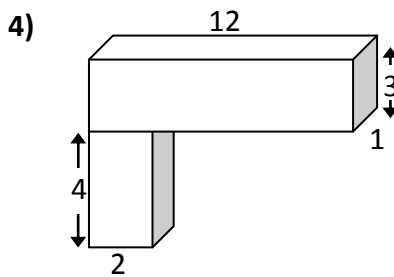
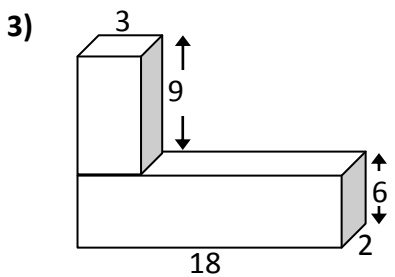
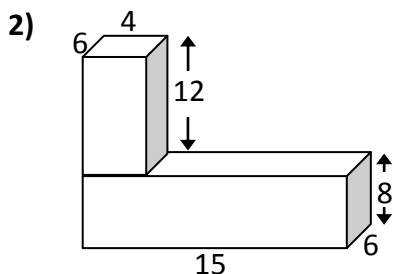
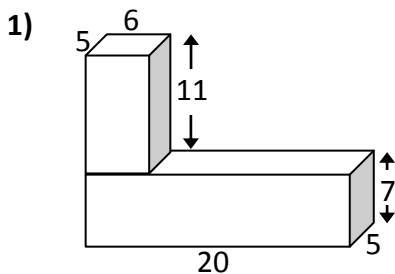


12)

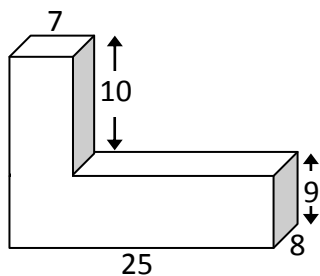


Exercise 3 (remember to include units in your answer: cm^3 , m^3 , km^3)

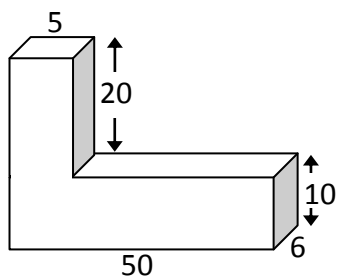
Work out the volume of the following cuboids (lengths are in cm)



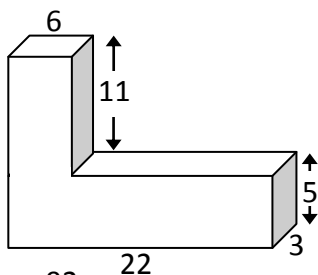
9)



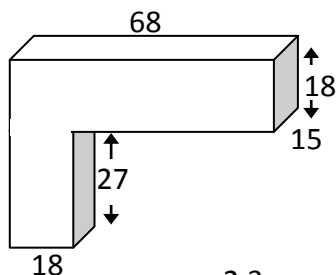
10)



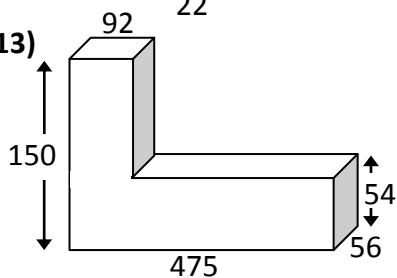
11)



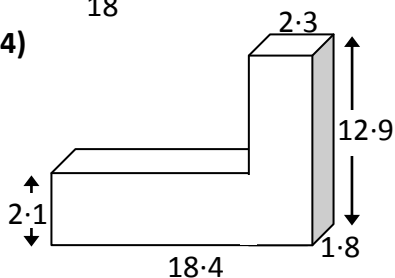
12)



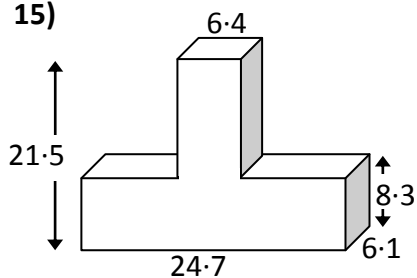
13)



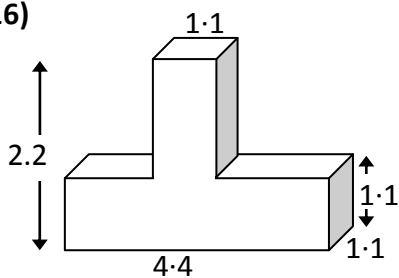
14)



15)



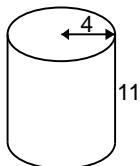
16)



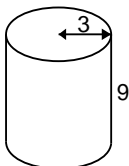
Exercise 4

Calculate the volume of these cylinders (all sizes in cm).

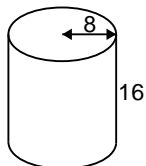
1)



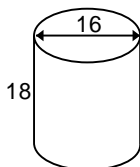
2)



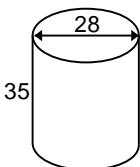
3)



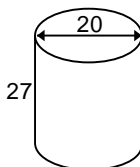
4)



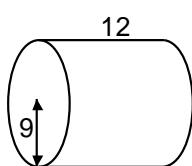
5)



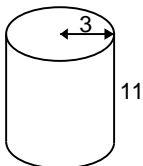
6)



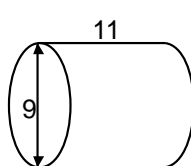
7)



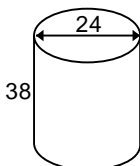
8)



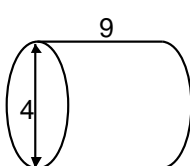
9)



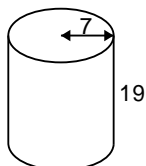
10)



11)



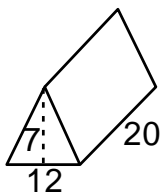
12)



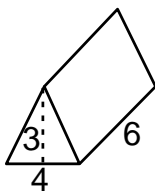
Exercise 5

Calculate the volume of these triangular prisms (all sizes in cm).

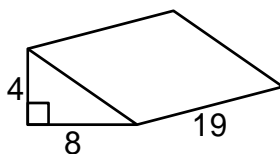
1)



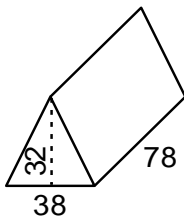
2)



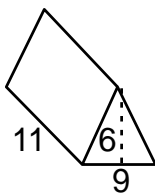
3)



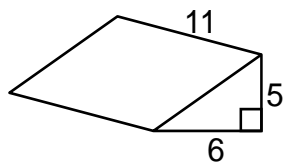
4)



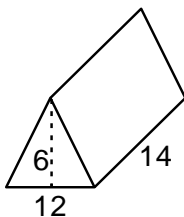
5)



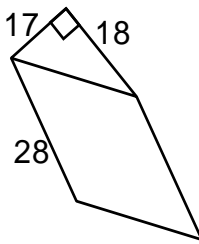
6)



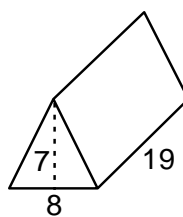
7)



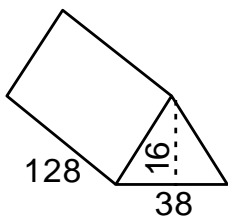
8)



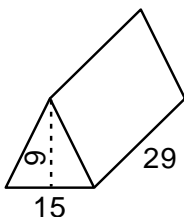
9)



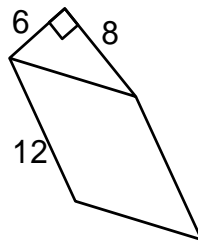
10)



11)



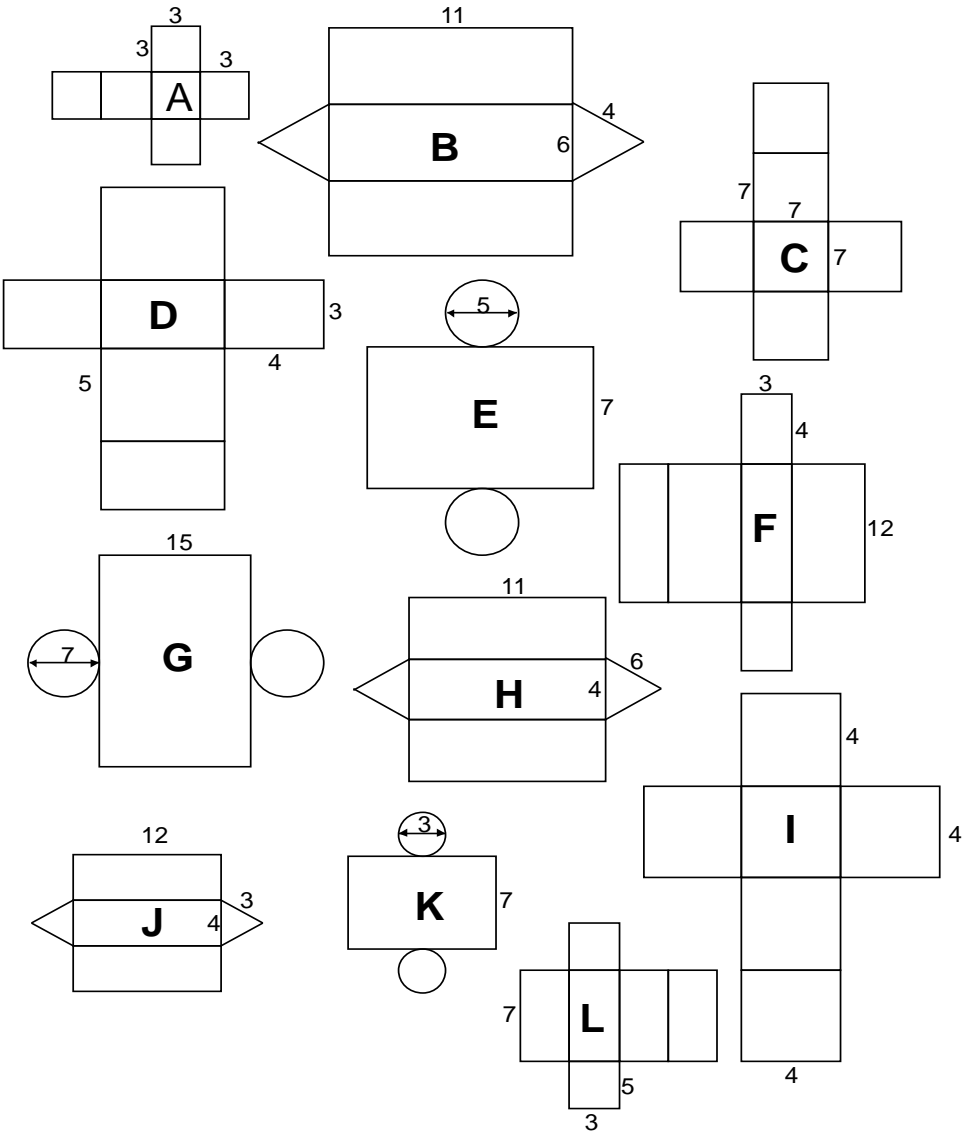
12)



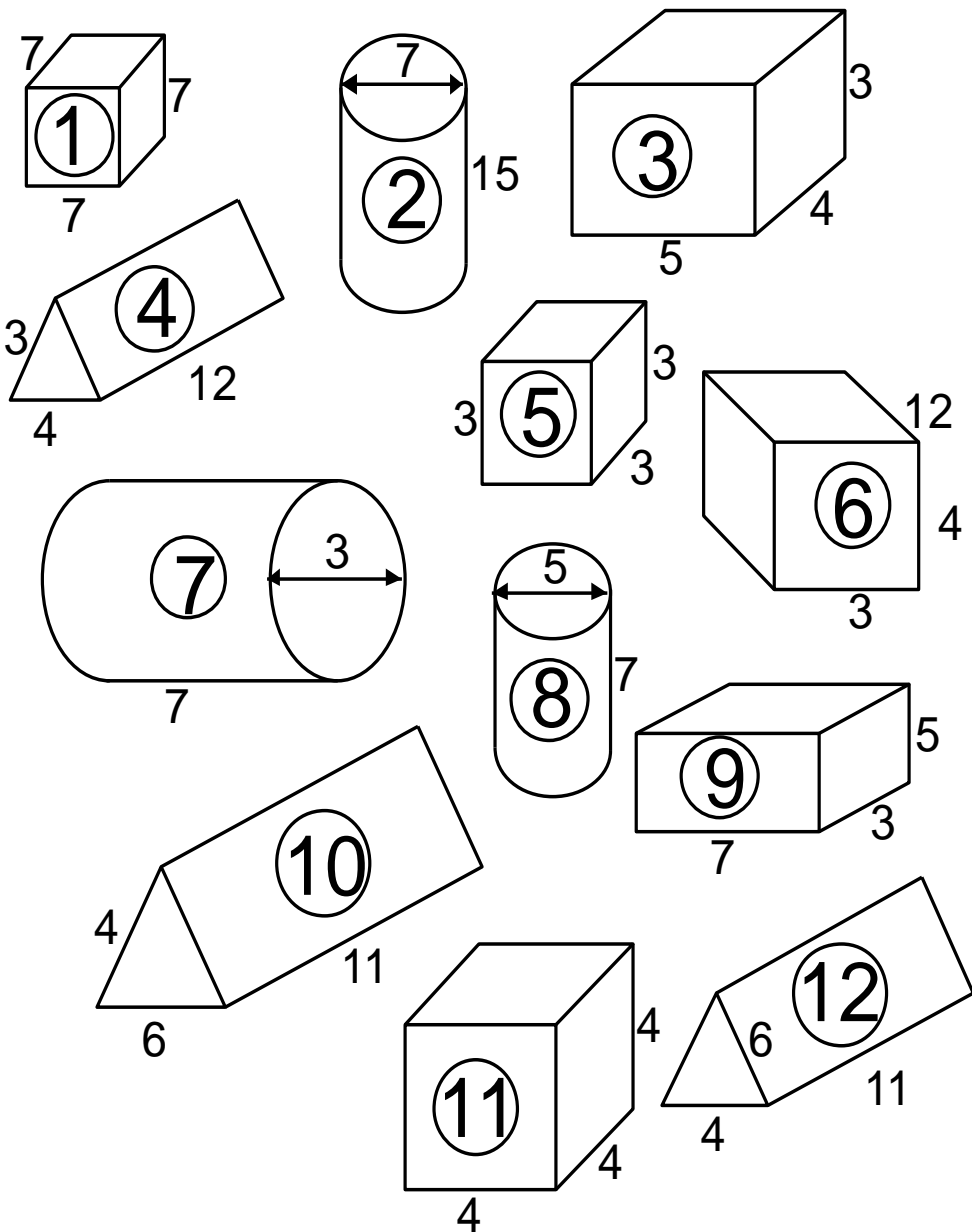
Nets and Surface Area

Exercise 1

Match the nets on this page with the solids on the opposite page (all sizes in cm)

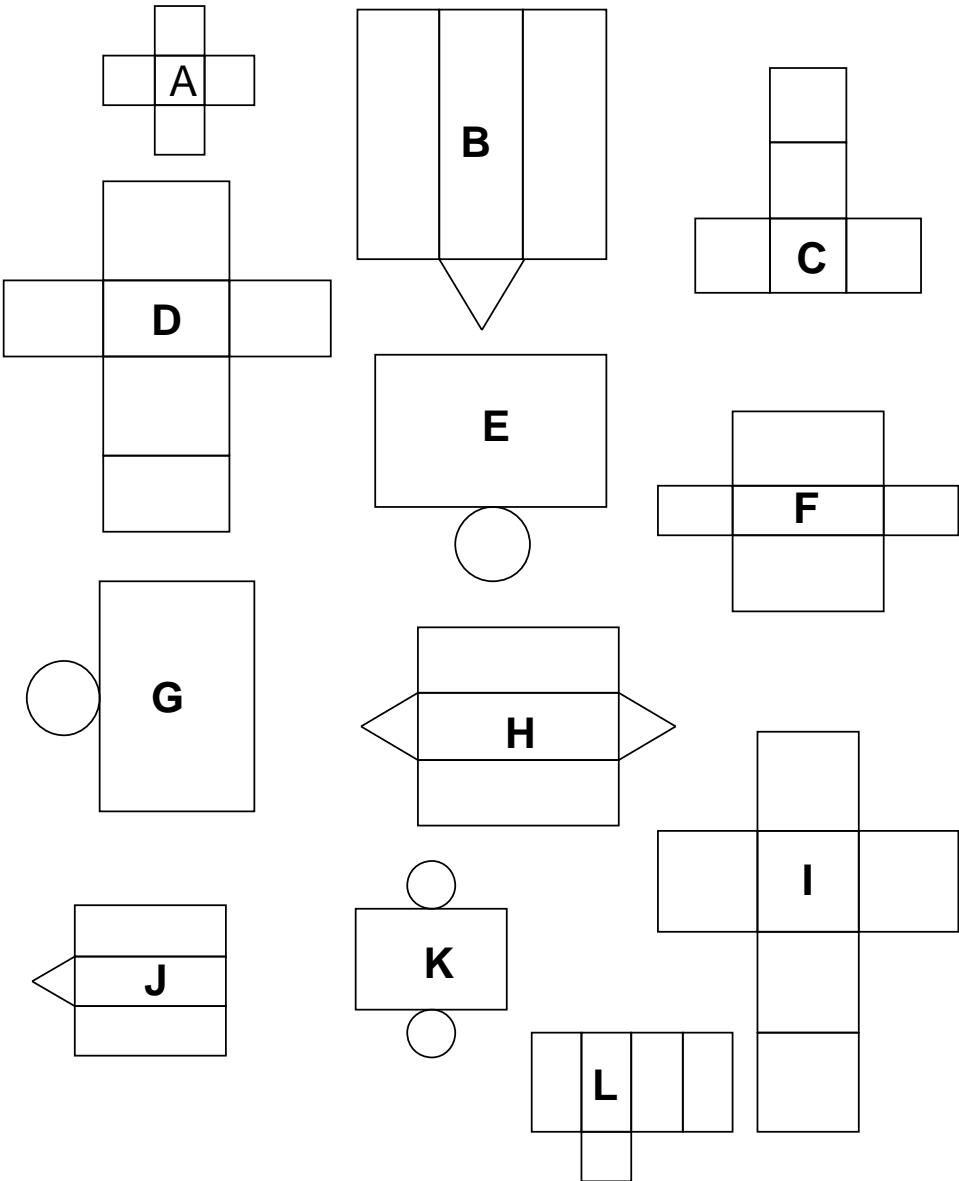


Exercise 1 (continued)

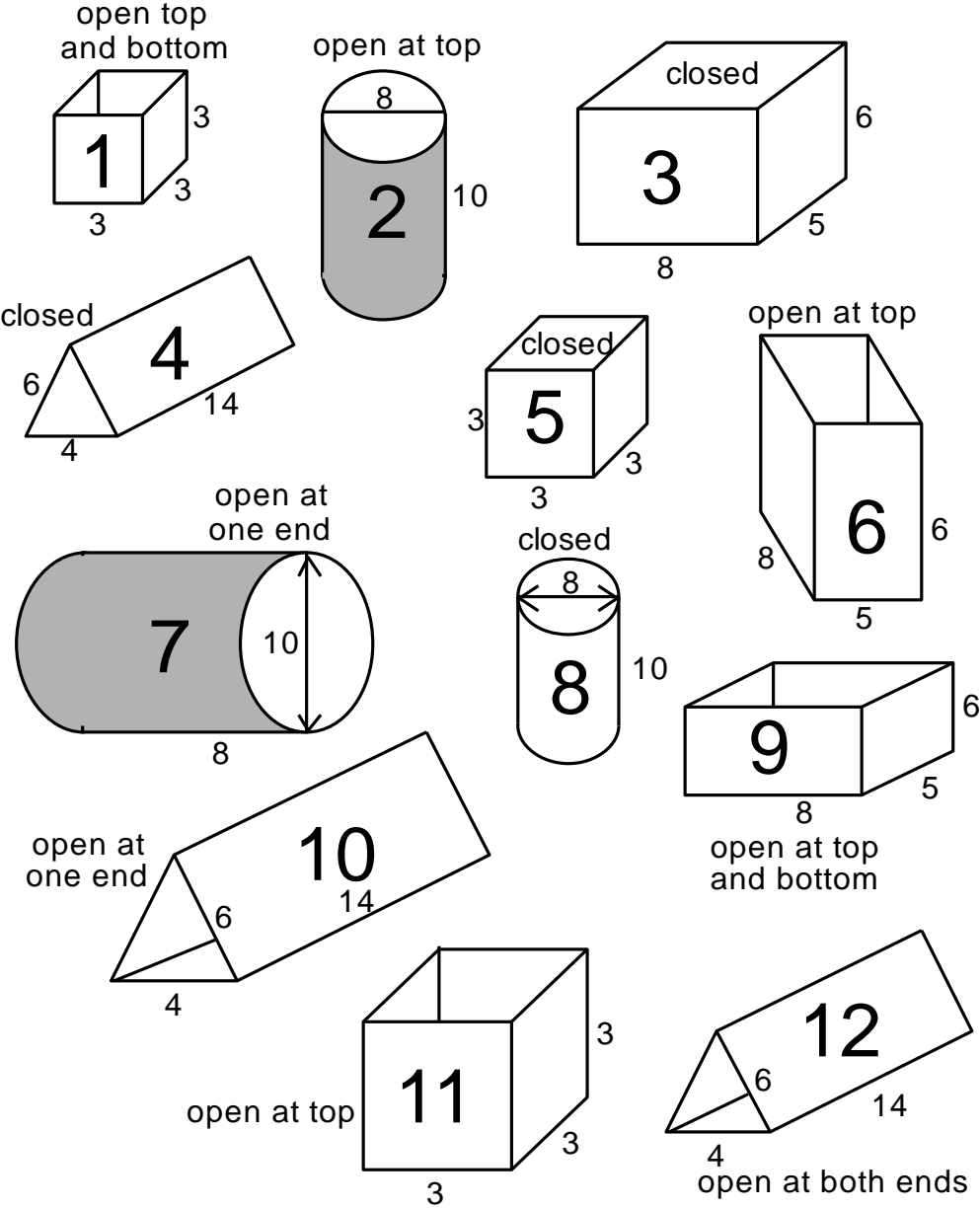


Exercise 2

Match the nets on this page with the shapes on the opposite page (all sizes in cm)



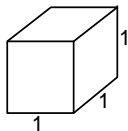
Exercise 2 (continued)



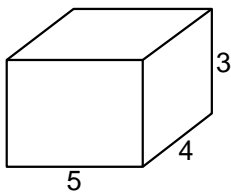
Exercise 3

Draw nets of the following shapes using the sizes (all in cm) given.

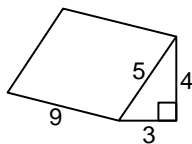
1)



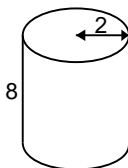
2)



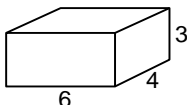
3)



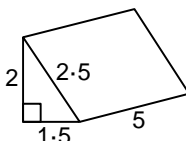
4)



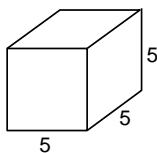
5)



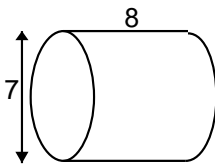
6)



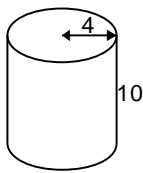
7)



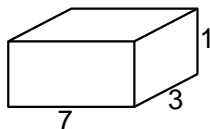
8)



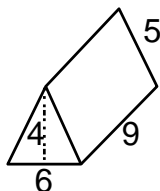
9)



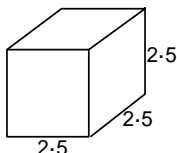
10)



11)



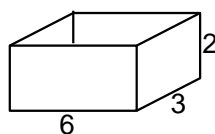
12)



Exercise 4

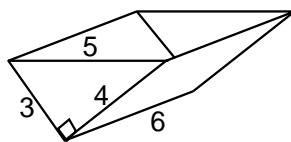
Draw nets of the following shapes using the sizes (all in cm) given.

1)



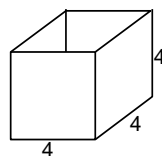
open at the top

2)



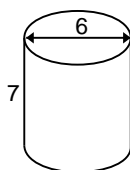
open at the top

3)



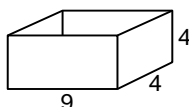
open at the top

4)



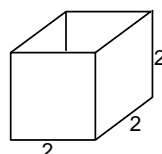
open at the top

5)



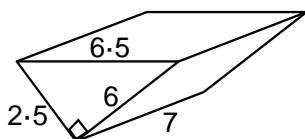
open at the top

6)



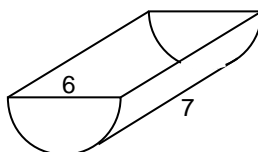
open at the top

7)



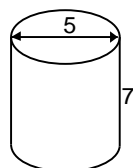
open at both ends

8)



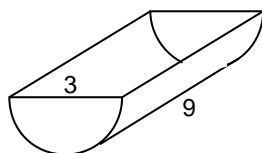
open at the top

9)



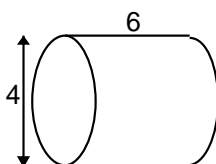
closed

10)



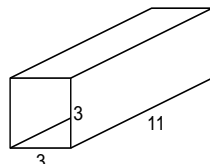
open at the top

11)



open at both ends

12)

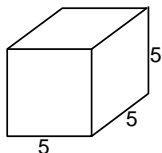


open at both ends

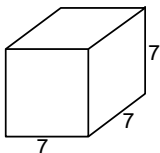
Exercise 5

Calculate the surface area of these cubes and cuboids (all sizes in cm).

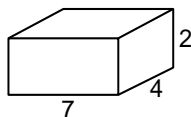
1)



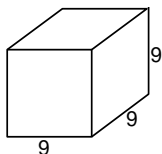
2)



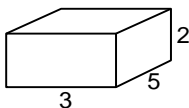
3)



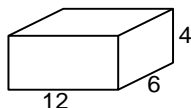
4)



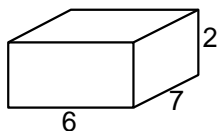
5)



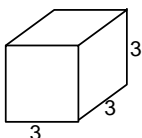
6)



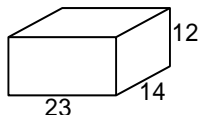
7)



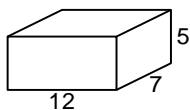
8)



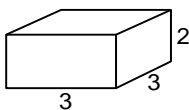
9)



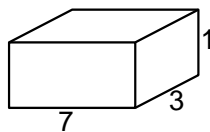
10)



11)



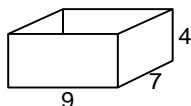
12)



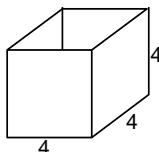
Exercise 6

Calculate the surface area of these trays – open at the top (all sizes in cm).

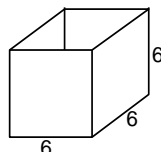
1)



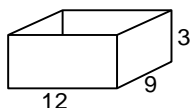
2)



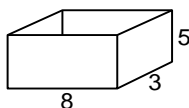
3)



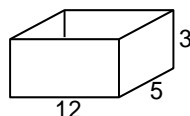
4)



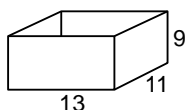
5)



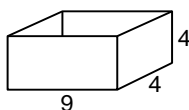
6)



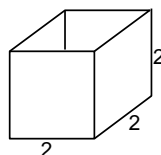
7)



8)



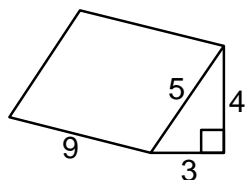
9)



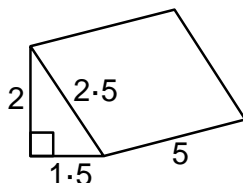
Exercise 7

Calculate the surface area of these triangular prisms (all sizes in cm).

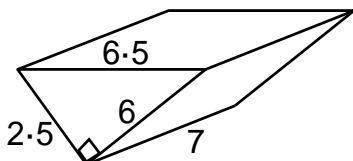
1)



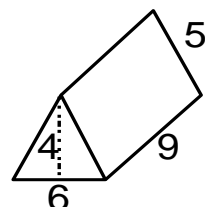
2)



3)



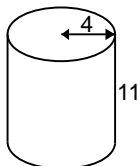
4)



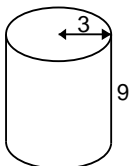
Exercise 8

Calculate the surface area of these cylinders (all sizes in cm).

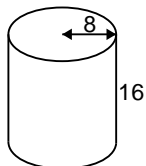
1)



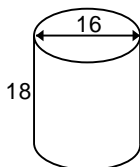
2)



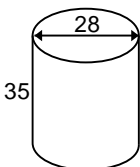
3)



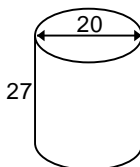
4)



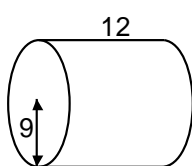
5)



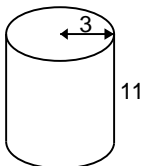
6)



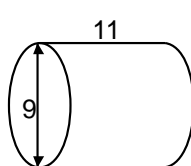
7)



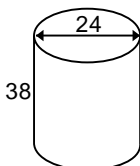
8)



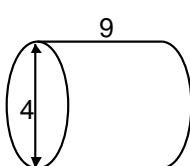
9)



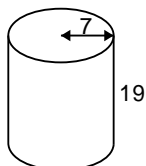
10)



11)




12)





Rotational Symmetry

Exercise 1


Decide whether the following shapes have rotational symmetry. For example


Rotational symmetry of order 5



No rotational symmetry




(1)




(2)




(3)




(4)




(5)




(6)




(7)




(8)




(9)




(10)




(11)



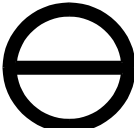
(12)




(13)



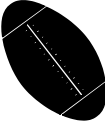
(14)




(15)




(16)




(17)



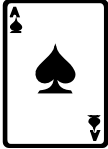
(18)



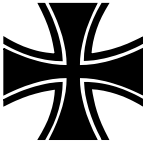
(19)



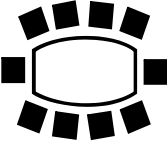
(20)




(21)




(22)




(23)




(24)




(25)




(26)



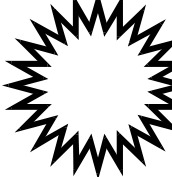
(27)



(28)



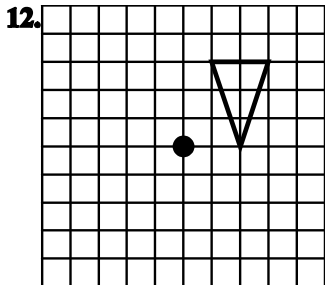
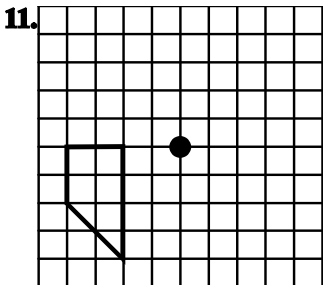
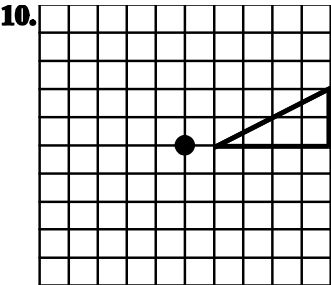
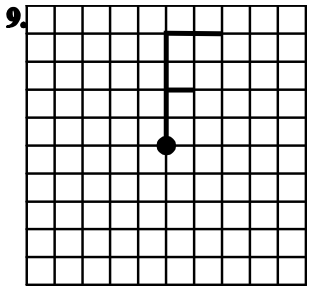
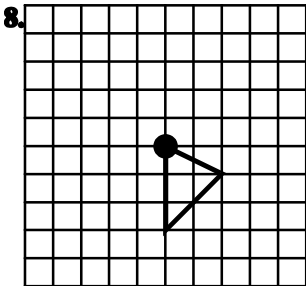
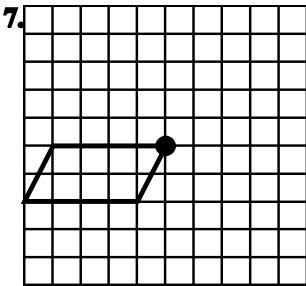
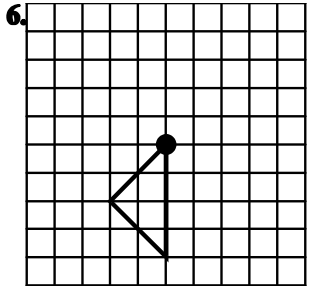
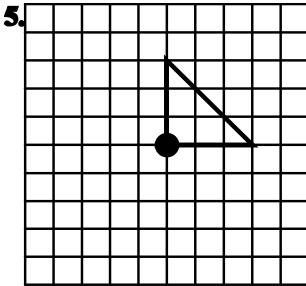
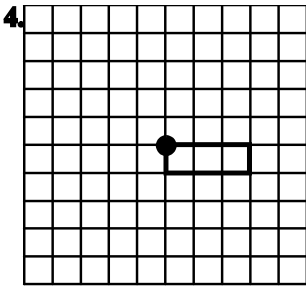
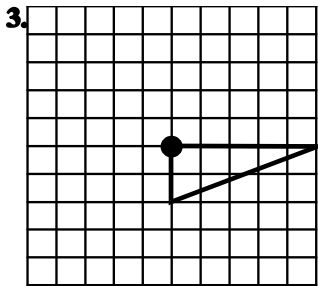
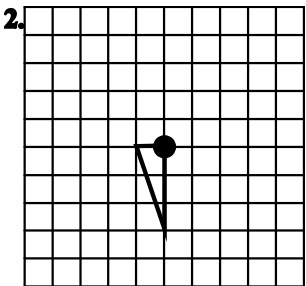
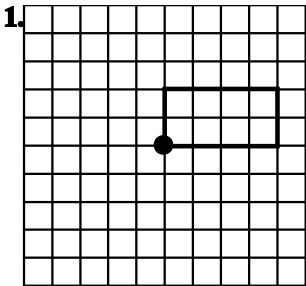
(29)



(30)

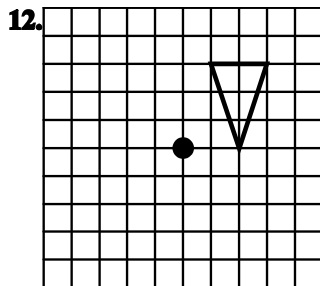
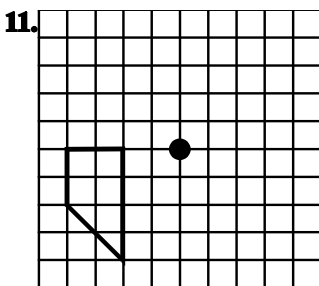
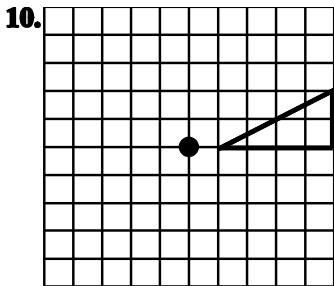
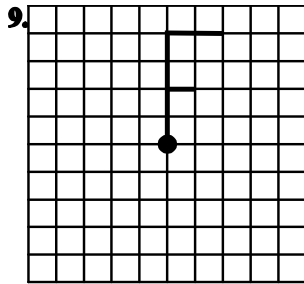
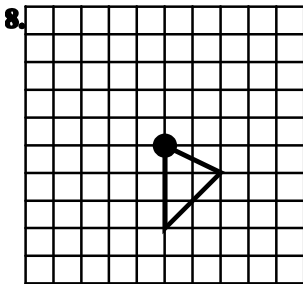
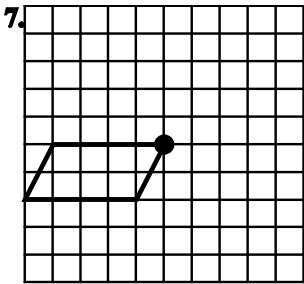
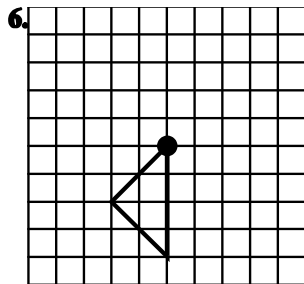
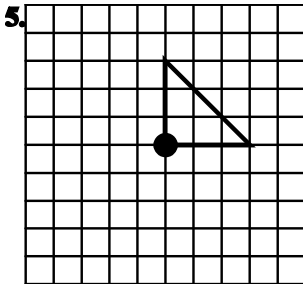
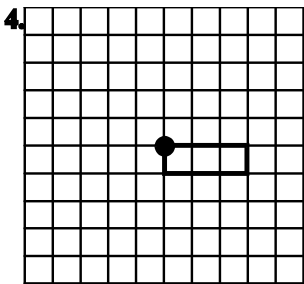
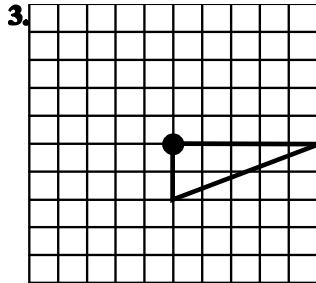
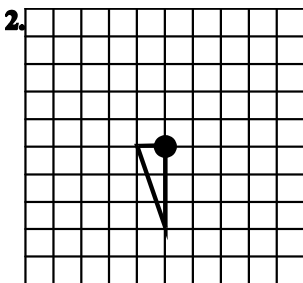
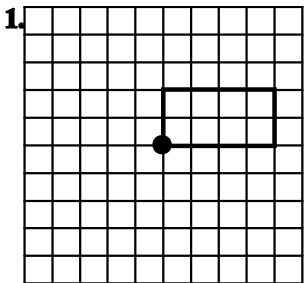
Exercise 2

Give the following shapes **half turn** symmetry about the marked point,



Exercise 3

Give the following shapes **quarter turn symmetry** about the marked point,



Frequency Tables

Exercise 1

1) The number of pupils in 10 register classes are listed below.

28	27	30	29	31	29	30	30	32	28
----	----	----	----	----	----	----	----	----	----

Copy and complete the frequency table for these results.

Pupils	Tally	Frequency
27		
28		
29		
30		
31		
32		
		Total =

2) The number of goals scored at each game in a 5 a side tournament are listed below.

1	4	2	1	3	3	6	1	5	2
4	4	2	5	3	0	0	1	0	2

Copy and complete the frequency table for these results.

Pupils	Tally	Frequency
1		
2		
		Total =

- 3)** This is the shoe size of each member of a football team.
6, 8, 7, 7, 9, 6, 10, 6, 8, 7, 7
Make a frequency table and fill in the information.
- 4)** This is the number of desks counted in several classrooms.
27, 27, 26, 26, 26, 28, 28, 27, 28, 31, 31, 31, 30
Make a frequency table and fill in the information.
- 5)** This is a list of the number of sunny days during each month.
4, 5, 5, 5, 4, 8, 12, 12, 8, 5, 5, 4
Make a frequency table and fill in the information.
- 6)** James was doing a science project where he had to measure the lengths of twigs. Here is his list of sizes in centimetres:
2, 4, 3, 5, 4, 3, 2, 5, 3, 2, 5, 6, 5, 6, 5, 6, 5,
Make a frequency table and fill in the information.
- 7)** In a recent school survey some pupils were asked how many jotters they carried to school in their bags each day. Below are the results.
3, 4, 4, 4, 4, 5, 6, 5, 5, 4, 3, 4, 3
Make a frequency table and fill in the information.
- 8)** Becky asks how many roads people cross on their way to school.
4, 5, 6, 7, 5, 7, 6, 7, 7, 7, 7
Make a frequency table and fill in the information.

Exercise 2

- 1) The number of visitors to a local shop was recorded each day for two weeks. The results are shown below.

28	54	48	32	51	59	60
39	45	52	58	49	53	68

Copy and complete this frequency table for these results.

Visitors	Tally	Frequency
20 – 29		
30 – 39		
40 – 49		
50 – 59		
60 – 69		
		Total =

- 2) Joe recorded the number of minutes he used his phone over a 14 day period. The results are shown.

16	22	5	13	21	23	10
9	15	7	22	18	3	24

Copy and complete this frequency table for these results.

Minutes	Tally	Frequency
0 – 4		
5 – 9		
		Total =

- 3) The number of strokes recorded by 16 players in a golf tournament is shown below. Use this data to construct a grouped frequency table, remember to use suitable class intervals (**65-69, 70-74**).

79	81	67	89	73	75	68	84
82	72	75	78	78	80	73	76

- 4) Each number below shows the score of 3 darts thrown by each member of 4C1. Using suitable class intervals construct a frequency table.

57	35	68	42	45	9	41	62	100	28	29	36	47	85
16	59	41	38	20	14	29	45	81	97	36	20	11	100

- 5) The number of pupils who own pets in each class in Larkhall Academy is shown below.

1	14	8	27	16	7	12	15
21	20	17	0	11	15	10	12
14	4	5	10	14	11	19	9
15	21	13	4	11	16	7	13

Show this information on a frequency table using suitable class intervals.

- 6) A class tidied their bedrooms and were asked to say how many coins they each found. The number of coins is listed below. From this information construct a frequency table with suitable class intervals.

4	3	18	15	31	9	0	2
11	6	27	15	12	11	15	4
22	15	16	26	25	17	13	3
9	7	1	9	16	7	21	10

- 7) A list of waiting times in minutes in a doctor's surgery are shown.

Construct a frequency table with suitable class intervals for this data.

0	4	22	11	11	19	10	12
5	8	25	26	15	17	2	18
20	13	14	19	21	23	1	14
9	29	12	1	3	5	18	19
10	27	3	12	7	21	10	2

- 8) Pupils in an S3 carried out a survey of their heights.

Below are the results they recorded in centimetres.

Construct a frequency table with suitable class intervals for this data.

162	165	175	178	181	182	169	163
173	175	174	180	160	161	173	172
171	170	166	164	169	175	174	167
166	177	178	184	183	164		

- 9) The distances in metres, recorded at the long jump at the county sports are shown below.

Construct a frequency table with suitable class intervals for this data.

6.52	5.01	5.43	5.61	6.25	6.48	5.84	5.29
6.38	5.72	5.98	6.46	6.26	5.09	5.47	5.98
6.21	6.94	5.84	6.07	6.43	5.34	6.40	6.04

- 10) Survey your class on how many people are in their family.

Display this information in a suitable Frequency Table.

Averages (Mean)

Exercise 1

- 1) Calculate the mean of this list

2, 4, 6, 8, 10, 12, 16, 18, 20

- 2) In nine maths tests during a year a boy scored

20, 22, 18, 21, 22, 16, 14, 19, 17

Find the mean.

- 3) The hours of sunshine recorded at a seaside resort in seven successive days were:-

7.3, 4.8, 1.7, 6.4, 5.9, 7.6, 6.9

Find the mean.

- 4) The members of a schools' relay team weighed:

47.5 kg, 49 kg, 52 kg and 53.5 kg.

Find the mean.

- 5) The length in minutes of telephone calls made by a business man on a certain day were:-

3, 7, 10, 2, 4, 8, 11, 9, 6, 3
2, 4, 8, 15, 14, 10, 8, 7, 4, 7

Find the mean.

- 6) The following w the temperatures in Edinburgh in 1985 for the first 14 days in June:-

21.9, 20.8, 23.1, 17.5, 11.4, 11.8, 13.0
15.1, 16.0, 15.5, 13.3, 11.2, 13.0, 16.2

Find the mean.

Averages (Mode)

Exercise 1

Find the mode for each set of numbers:-

1) 2, 3, 4, 4, 7

2) 2, 3, 4, 5, 5, 6, 7, 8

3) 2, 3, 4, 4, 4, 5, 6, 6, 6, 6, 7

4) 8, 9, 7, 8, 5, 6, 9, 7, 9, 10, 9

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

6) £12, £13, £13, £13, £14, £15, £15, £16, £17

7) Twelve boys apply to go on an outward bound course. Their ages are:-

16, 14, 15, 16, 15, 17, 15, 16, 15, 17, 16, 15

Find the mode of their ages.

8) The list below shows how many pupils in class 2B were absent on each day of a three-week period.

Mon	0	Mon	2	Mon	0
Tue	1	Tue	1	Tue	0
Wed	2	Wed	1	Wed	1
Thu	2	Thu	0	Thu	2
Fri	1	Fri	1	Fri	2

Find the modal number of absentees.

9) A cricketer plays for one club for fifteen seasons. The list below shows how many centuries that he scored in each of the seasons:-

4, 3, 0, 5, 4, 5, 2, 4, 1, 2, 4, 1, 0, 2, and 0

Find his modal number of centuries.

10) The list below shows how many suits were sold at a tailor's shop on each day of a three week period:-

Mon	2
Tue	1
Wed	4
Thu	2
Fri	3
Sat	5

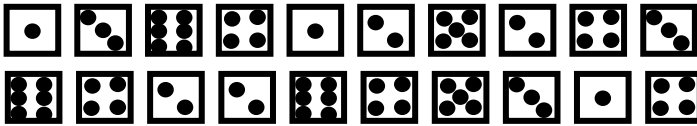
Mon	1
Tue	4
Wed	3
Thu	2
Fri	5
Sat	2

Mon	4
Tue	1
Wed	5
Thu	3
Fri	2
Sat	4



Find the modal number of suits sold.

- 11) A die is thrown twenty times and the scores are shown below:-



Find the modal score.

- 12) The list below shows how many lunches a café served on each day of a three week period:-

Mon	5
Tue	7
Wed	6
Thu	5
Fri	6
Sat	4

Mon	4
Tue	7
Wed	5
Thu	6
Fri	5
Sat	6

Mon	5
Tue	5
Wed	8
Thu	7
Fri	6
Sat	7



Find the modal number of lunches served.

- 13) A footballer made twenty appearances during a certain season and scored the following numbers of goals in the matches:-

0, 1, 2, 1, 0, 2, 3, 0, 1, 2, 1, 0, 3, 0, 1, 2, 1, 3, 3, 2

Find the modal number of goals that he scored.

- 14) The list below shows how many pupils there are in each of the twenty classes at Westmead school.

26, 25, 24, 22, 24, 23, 26, 25, 23, 25
26, 24, 25, 25, 22, 23, 23, 25, 24, 23

Find the modal number of pupils per class.

15) A girl's tennis club has 25 members and shown below are their ages:-

16, 18, 15, 18, 16, 15, 14, 16, 17, 15, 17, 16,
17, 14, 18, 16, 18, 15, 18, 17, 17, 16, 17, 18,
17

Find the modal age of the members.

Averages (Median)

Exercise 1

Find the median for each set of numbers:-

- 1) 1, 2, 3, 4, 4, 7
- 2) 2, 3, 4, 5, 5, 7, 8
- 3) 2, 3, 4, 4, 4, 5, 6, 6, 6, 6, 7
- 4) 8, 9, 7, 8, 5, 6, 9, 7, 9, 10, 9
- 5) 1, 5, 4, 2, 1, 1, 3, 5, 4, 3, 2, 4, 6, 4
- 6) 2, 4, 6, 8, 10, 12, 14, 16, 18, 20
- 7) 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
- 8) 3, 6, 9, 12, 15, 18, 21, 24, 27
- 9) 5, 10, 15, 20, 25, 30, 35
- 10) 4, 14, 24, 34, 44, 54, 64
- 11) 37, 43, 57, 68, 72, 89
- 12) £2.50, £3.83, £1.98, £4.25, £5.29

Averages (Mixed) including RANGE

Exercise 1

In each question find the mean, median, mode and range:-

- 1) a) 1, 2, 2, 9, 10 b) 13, 16, 17, 21, 21
c) 20, 20, 23, 23, 23, 24, 26 d) 35, 40, 47, 53, 61, 94, 94
- 2) a) 2, 3, 5, 5 b) 4, 4, 6, 10, 11, 15
c) 3, 4, 5, 8, 12, 12, 14, 16 d) 0, 0, 1, 1, 5, 9, 10, 10, 10, 16
- 3) a) 6, 5, 3, 2, 6 b) 6, 3, 4, 6, 11
c) 9, 8, 9, 12, 7 d) 14, 15, 13, 11, 11, 19, 15
e) 22, 29, 27, 41, 32, 23, 22 f) 14, 15, 14, 15, 14, 12, 13, 16
- 4) a) 5, 4, 2, 5 b) 6, 3, 6, 9
c) 23, 18, 11, 11, 16, 17 d) 26, 28, 31, 23, 23, 37
e) 50, 45, 44, 45 f) 48, 56, 62, 68, 56, 52
g) 70, 73, 74, 76, 73, 72
- 5) a) 25, 25, 24, 22, 23, 21, 28 b) 64, 58, 56, 55, 56, 59
c) 75, 54, 46, 50, 46, 70, 58 d) 121, 80, 89, 86, 99, 89
e) 62, 66, 80, 140, 70, 62 f) 82, 82, 80, 80, 85, 85, 80

Pie Charts

- 1) A survey of types of cars using a car park is made with the following results:

Ford	Vauxhall	Nissan	Other
60	40	30	50

Show this information on a pie chart.

- 2) A survey was carried out to find out what 72 pupils did at the end of 5th year.

In to 6th year	Employment	College	Unknown
16	24	20	16

Show this information on a pie chart.

- 3) During a short observation period the colours of cars passing a school were noted, with the following results:

Black	Blue	Green	Red	White	Other
4	10	16	14	9	7

Show this information on a pie chart.

- 4) During the course of a week a hotel waitress received £48 in tips. The table below shows how much she received on each day.

Mon	Tues	Wed	Thur	Fri	Sat
£4	£6	£12	£2	£16	£8

Show this information on a pie chart.

- 5) One day a baker sells 180 loaves of bread. The list below shows how many loaves of each kind. Draw a pie chart to illustrate the information.

75 large white

40 small white

45 large brown

20 small brown

- 6) A survey was conducted in a fourth year class to find the favourite sport of the pupils. The results were as follows:

football 10

netball 6

volleyball 5

rugby 3

athletics 6

badminton 4

Draw a pie chart to show this information

(Note: The angles don't work out nicely!)

Probability

Exercise 1

- 1) If a letter is chosen at random from the word SUCCESS, what is the probability that it will be:
- a) the letter S? b) the letter C?
- 2) If a letter is chosen at random from the word PEPPER, what is the probability that it will be:
- a) the letter P? b) the letter E?
- 3) If a letter is chosen at random from the word GEORGE, what is the probability that it will be:
- a) the letter E? b) the letter G?
- c) a vowel? d) a consonant?

- 4)** If a letter is chosen at random from the word PENELOPE, what is the probability that it will be:
- a)** the letter E? **b)** the letter P?
c) a vowel? **d)** a consonant?
- 5)** If a letter is chosen at random from the word WOODWORK, what is the probability that it will be:
- a)** the letter O? **b)** the letter W? **c)** a consonant?
- 6)** If a letter is chosen at random from the word NEEDLEWORK, what is the probability that it will be:
- a)** the letter E? **b)** a vowel? **c)** a consonant?
- 7)** On a supermarket shelf there are 16 bags of sugar, 12 of which contain white sugar and 4 of which contain brown sugar. If a bag is taken at random, what is the probability that it will contain:
- a)** white sugar? **b)** brown sugar?
- 8)** In class 3A there are 12 boys and 8 girls. If the pupils leave their classroom and walk to the assembly hall in any random order, what is the probability that the first pupil to enter the hall will be:
- a)** a boy? **b)** a girl?
- 9)** A farmer has 25 white sheep and 5 black sheep. If they are rounded up for shearing in any random order, what is the probability that the first one to be sheared will be:
- a)** white? **b)** black?
- 10)** A box of sweets contains 15 chocolates, 9 toffees and 6 nougats. If a sweet is taken from the box at random, what is the probability that it will be:
- a)** a chocolate? **b)** a toffee? **c)** a nougat?

- 11)** In class 2B there are 18 girls with dark hair, 10 girls with fair hair and 2 girls with red hair. If their teacher asks one girl at random to give out some books, what is the probability that she will have:
- a)** dark hair? **b)** fair hair? **c)** red hair?
- 12)** A £1 cash bag contains six 10p coins, four 5p coins, six 2p coins and eight 1p coins. If a coin is removed from the bag, what is the probability that it will be a:
- a)** 10p coin? **b)** 5p coin? **c)** 2p coin?
d) 1p coin? **e)** silver coin? **f)** copper coin?
- 13)** On a supermarket shelf there are 8 packets of plain crisps, 5 packets of cheese and onion crisps, 3 packets of salt and vinegar crisps and 4 packets of smokey bacon crisps. If a bag is removed from the shelf at random, what is the probability that it will contain:
- a)** plain crisps? **b)** cheese and onion? **c)** salt and vinegar?
d) smokey bacon? **e)** any kind of flavoured crisps?
- 14)** Each month of the year is written on a card and the twelve cards are then placed in a bag. If one of the cards is then removed from the bag, what is the probability that:
- a)** the first letter on the card is J?**b)** the first letter on the card is M?
c) the first letter on the card is A?**d)** the last letter on the card is R?
e) the last letter on the card is Y?
- 15)** A bag contains 40 counters, 8 of which are red, 12 of which are yellow, 4 of which are green and 16 of which are blue. If a counter is removed from the bag, what is the probability that it is:
- a)** red? **b)** yellow? **c)** green?
d) blue? **e)** red or yellow? **f)** red or green?

- 16)** If a die is thrown, what is the probability that the score will be:
- a)** a six? **b)** an odd number? **c)** an even number?
 - d)** a multiple of 3? **e)** a prime number? **f)** a square number?
- 17)** Twelve counters numbered 1 to 12 are placed in a bag. If a counter is removed from the bag, what is the probability that the number on it will be:
- a)** a prime number? **b)** a square number? **c)** an even number?
 - d)** a multiple of 3? **e)** a multiple of 5? **f)** a multiple of 4?
- 18)** Twelve counters lettered A, B, C, D, E, F, G, H, I, J, K and L are placed in a bag. If a counter is removed from the bag, what is the probability that the letter on it will be:
- a)** a vowel? **b)** a consonant?
 - c)** any letter of the word CAGE?
 - d)** any letter of the word BLEACH?
- 19)** A pack of 52 playing cards is shuffled thoroughly and a card is then removed. What is the probability that the card:
- a)** is an ace? **b)** is any king, queen or jack?
 - c)** shows any number from 2 to 10?
 - d)** shows any even number?
 - e)** shows an odd number?
- 20)** A pack of 52 playing cards is shuffled thoroughly and a card is then removed. What is the probability that the card:
- a)** is a king? **b)** is the king of hearts?
 - c)** is a red king? **d)** is not a king?

- 21)** A pack of 52 playing cards is shuffled thoroughly and a card is then removed. What is the probability that the card:
- a)** is a red ? **b)** is a heart?
 - c)** is an even heart? **d)** is the 4 of hearts?
- 22)** A pack of 52 playing cards is shuffled thoroughly and a card is then removed. What is the probability that the card:
- a)** is a 5, 6 or 7? **b)** is the 5, 6, or 7 of hearts?
 - c)** is a red 5, 6 or 7? **d)** is not the 5, 6 or 7 of hearts?
- 23)** A bag contains 5 red counters and 12 green counters.
- a)** If a counter is removed what is the probability that it is red?
 - b)** If the counter was red and it was not replaced what is the probability that the next counter to be picked out would also be red?
- 24)** A bag contains 8 red counters and 5 green counters.
- a)** If a counter is removed what is the probability that it is red?
 - b)** If the counter was red and it was not replaced what is the probability that the next counter to be picked out would also be red?
- 25)** A bag contains 6 red counters and 10 green counters.
- a)** If a counter is removed what is the probability that it is red?
 - b)** If the counter was red and it was not replaced what is the probability that the next counter to be picked out would also be red?

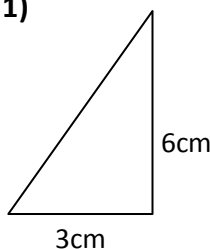
- 26)** A bag contains 1 red counter and 5 green counters.
- a)** If a counter is removed what is the probability that it is red?
 - b)** If the counter was red and it was not replaced what is the probability that the next counter to be picked out would also be red?
- 27)** An ordinary die is thrown.
- a)** What is the probability of obtaining a 5?
 - b)** What is the probability of not obtaining a 5?
 - c)** What do you notice about these two results?
 - d)** What is the probability of obtaining a number greater than 4?
 - e)** What is the probability of obtaining a whole number less than 7?
 - f)** What is the probability of obtaining a number more than 6?
- 28)** A letter is selected at random from the word PROBABILITY.
- a)** What is the probability that the letter is a vowel?
 - b)** What is the probability that the letter is one of the first 2 letters of the alphabet?
 - c)** What is the probability that the letter is a consonant not next to a vowel?
- 29)** A card is selected at random from a normal pack of playing cards.
- a)** What is the probability of obtaining “a heart”?
 - b)** What is the probability of obtaining “a red 4”?
 - c)** What is the probability of obtaining “an ace”?
- 30)** A counter is drawn from a box containing 10 red, 15 black, 5 green and 10 yellow counters.
- Find the probability that the counter is:
- a)** black
 - b)** not yellow
 - c)** red, black or yellow.

Gradient

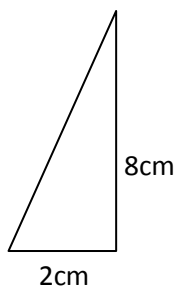
Exercise 1

Find the gradient of the sloping line the right angled triangles below.

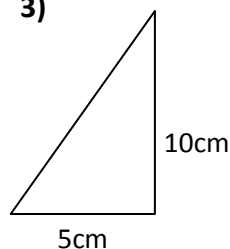
1)



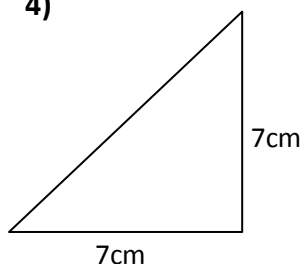
2)



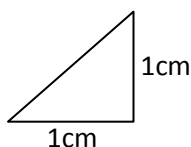
3)



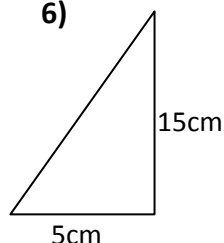
4)



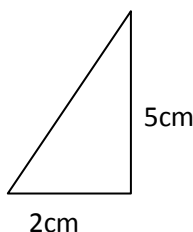
5)



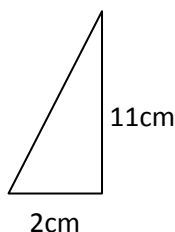
6)



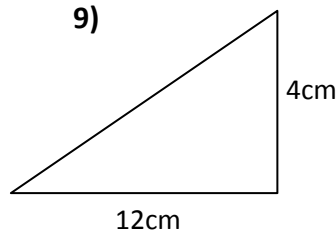
7)



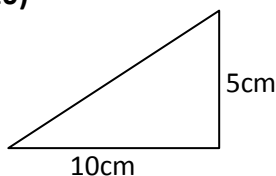
8)



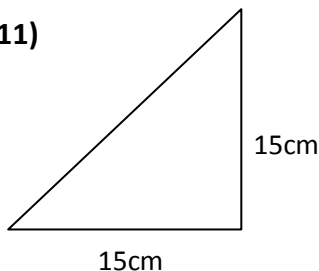
9)



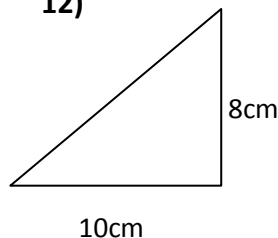
10)



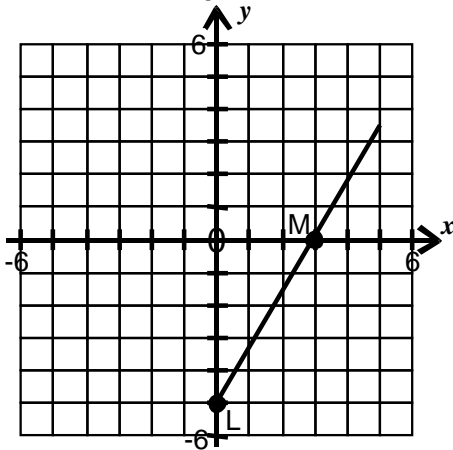
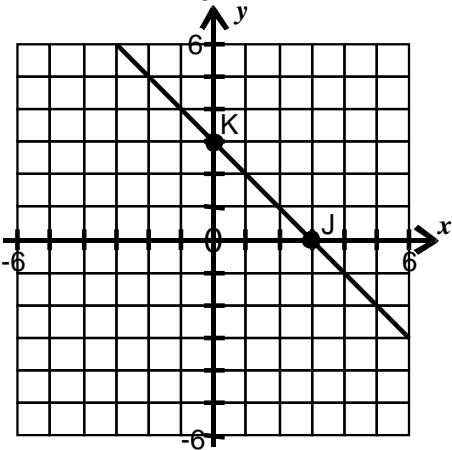
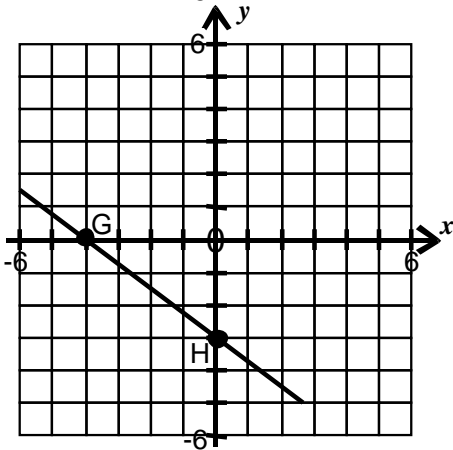
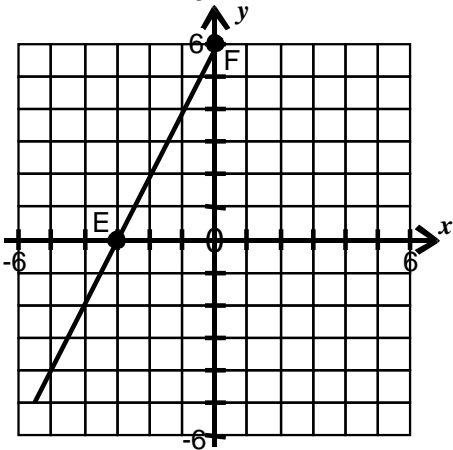
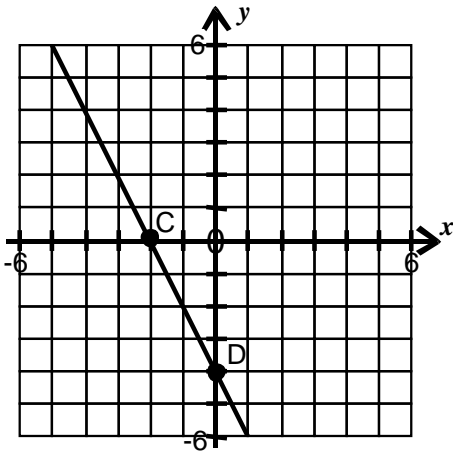
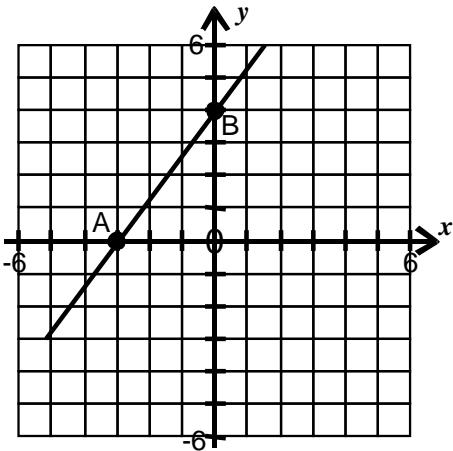
11)



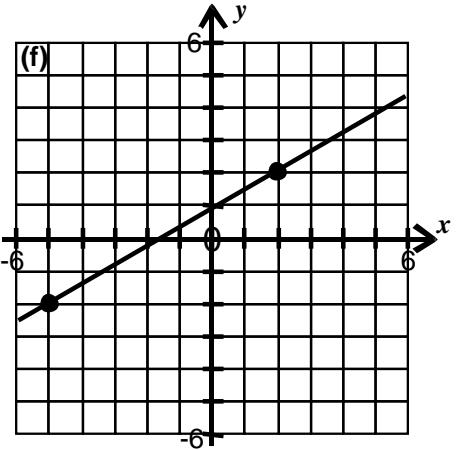
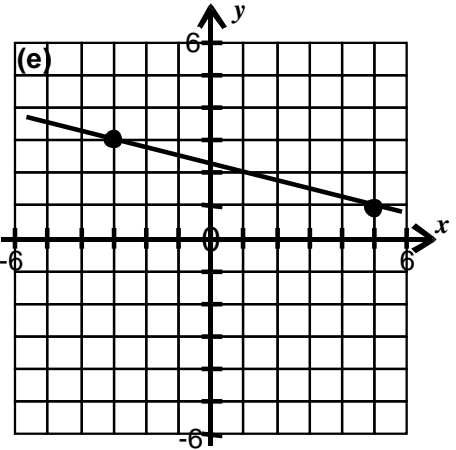
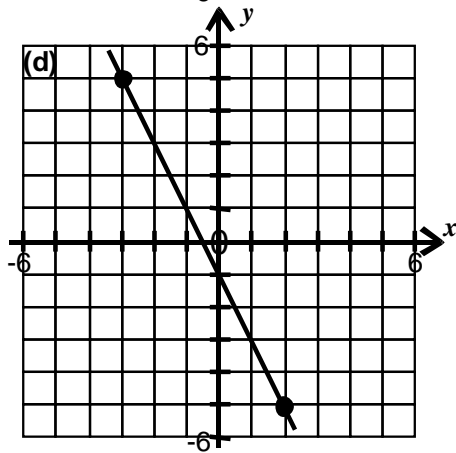
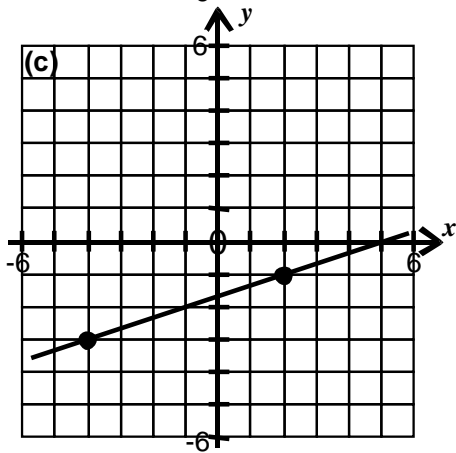
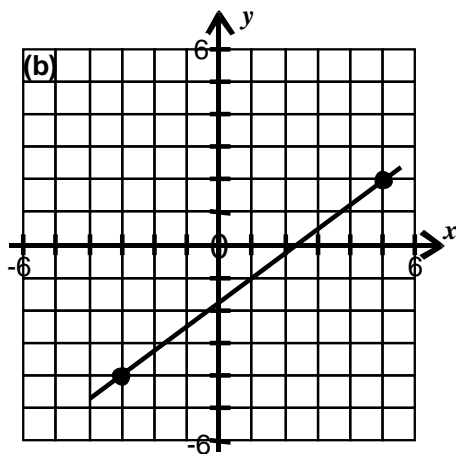
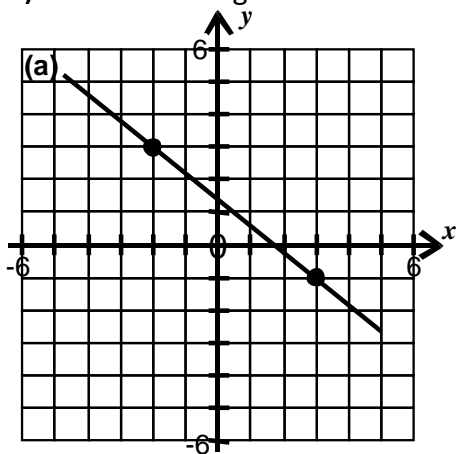
12)



Exercise 2 – Name each line then calculate its gradient.

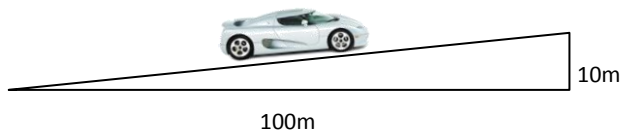


3) Work out the gradient of each line.



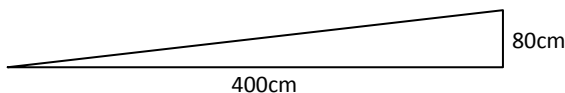
Exercise 2

- 1) A car is driving along the road shown in the diagram. Calculate the gradient of the hill on the road.



- 2) Brian needs to fit a wheelchair ramp at his house to allow his Gran access to the house. For safety reasons the gradient cannot be greater than 0.3.

The dimensions of the ramp are shown in the diagram.



- a) Calculate the gradient of the ramp.
- b) Does the ramp meet the safety requirements?
- 3) To be eligible for hosting the Winter Olympics a ski slope must have a gradient of at least -1.6 ;

Larkhall has a slope in Strutherhill which is shown in the diagram below. Is Larkhall eligible to host the next Winter Olympics?

All working must be shown.

