

Dingwall Academy Mathematics Department



Unit 1. Expressions and Formula.

Preparation for Assessment

This worksheet contains several examples of the type of questions you will be asked to complete in your Unit Assessment. This will give you the opportunity to practice the questions and consolidate the skills you will need to pass.

Q1 a) Expand the brackets

$$5(4c - 3) \quad 2(6f - 7) \quad 4(3w - 1) \quad 9(2h + 3) \quad 2(3 - 7x) \quad 3(4 + 9g) \quad 5(2m - 7)$$
$$3(5t + 3) \quad 8(2r - 3) \quad 5(5g + 1) \quad 3(7b + 2) \quad 4(5 - 12d) \quad 11(2 + 3a) \quad 9(2p - 3)$$

Q1 b) Expand the brackets and simplify

$$2(3h - 4) + 6h \quad 5(3f + 4) + 2f \quad 4(3 + 5t) - 7t \quad 3(5 - 2d) + 7d$$
$$4(2h - 3) + 5h \quad 11(2f - 3) - 4f \quad 3(3 + 2k) - 2k \quad 2(4 - 5d) + 13d$$
$$7(3h - 6) - 12h \quad 3(4r - 7) + 8r \quad 2(1 + 3t) - 3t \quad 4(9 - 2m) + 15m$$

Q2 Factorise

$$3t - 24 \quad 5r + 15 \quad 7p - 14 \quad 8r - 4 \quad 12f + 8 \quad 6t - 27 \quad 7c + 28$$
$$2r - 18 \quad 4q + 12 \quad 35 - 14z \quad 9 - 6g \quad 44 + 11w \quad 15 + 25k \quad 7c + 28$$

Q3 Simplify

$$5r + 7g + 2r - 4g \quad 9c - 3w + 2c + 7w \quad 3r + 8q - r - 3q$$
$$13b + 2a - 9b + 5a \quad 4q - 3p + 15q + 7p \quad 3k + 7v + 9k - 4v$$
$$15f + 4g - 9f - 7g \quad -2d + 7t + 8d - 11t \quad 18y + 4x - 12y - 6x$$

Q4a When $a = 3$ and $b = 9$, find the value of $5a + 2b$.

When $c = 5$ and $d = 2$, find the value of $6c - 4d$.

When $e = 8$ and $f = 7$, find the value of $8e - 7f$.

When $g = 5$ and $h = 12$, find the value of $2g + 3f$.

When $i = 11$ and $j = 3$, find the value of $3i - 4j$.

When $k = 7$ and $l = 2$, find the value of $12k - 9l$.

When $m = 2$ and $n = 4$, find the value of $2ab - 3a$.

When $p = 6$ and $q = 4$, find the value of $3pq + 2q$.

When $r = 8$ and $s = 3$, find the value of $9rs + s^2$.

When $t = \frac{1}{2}$ and $u = 4$, find the value of $6t + ut$.

Q4 b)i John works picking apples.

His pay is calculated using the following formula.

$$P = 7.1H + 1.8K$$

Where P is his pay (in pounds), H is the number of hours he works, and K is the number of 10Kg boxes he fills.

One week he works 37 hours and picks 23 boxes.

Calculate his pay for that week.

ii Peter hires a car.

The cost of hiring the car is worked out using the following formula.

$$C = 23.5D + 0.1M$$

Where C is the cost (in pounds), D is the number of days the car is hired, and M is the miles covered.

Peter hires the car for 3 days and covers a total of 430 miles.

Calculate the cost of hiring the car.

iii Wendy is running a Candle Party.

Wendy's commission is worked out using the following formula.

$$C = 0.5S + 0.15V$$

Where C is her commission (in pounds), S is the number of sales, and V is the value of the sales.

At one party Wendy makes 43 sales with a total value of £760.

Calculate Wendy's commission for the party.

iv Jill works picking oranges.

Her pay is calculated using the following formula.

$$P = 8.6H + 2.3K$$

Where P is her pay (in pounds), H is the number of hours she works, and K is the number of 10Kg boxes she fills.

One week she works 35 hours and picks 19 boxes.

Calculate her pay for that week.

v David hires a car.

The cost of hiring the car is worked out using the following formula.

$$C = 39.5D + 0.06M$$

Where C is the cost (in pounds), D is the number of days the car is hired, and M is the miles covered.

David hires the car for 4 days and covers a total of 820 miles.

vi Calculate the cost of hiring the car.

Jenny is running a Candle Party.

Jenny's commission is worked out using the following formula.

$$C = 0.4S + 0.25V$$

Where C is her commission (in pounds), S is the number of sales, and V is the value of the sales.

At one party Jenny makes 57 sales with a total value of £870.

Calculate Jenny's commission for the party.

Q5a) Paul is bored and starts to make the following patterns using paperclips.



1 square



2 squares



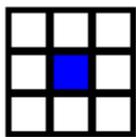
3 squares

Complete the table below

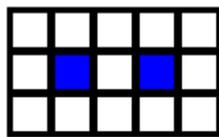
Number of squares (S)	1	2	3	4	5		12
Number of Paperclips (P)	4	7					

- b)** Write a formula for calculating the number of paperclips when you know the number of squares.
- c)** One day he makes a pattern using 73 paperclips. How many squares are in the pattern?
Working must be shown.

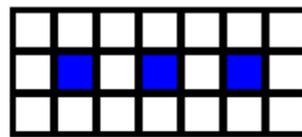
Q5a) Katie is creating a tiling pattern in her bathroom using blue tile and white tiles.



1 blue tile



2 blue tiles



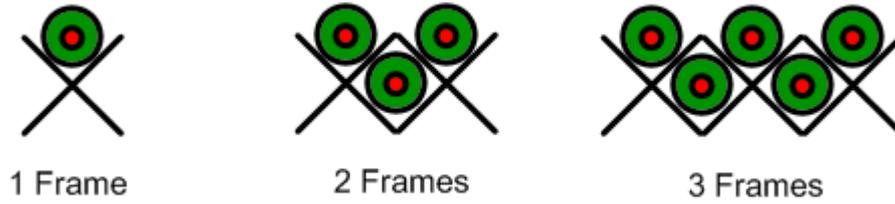
3 blue tiles

Complete the table below

Number of blue tile (B)	1	2	3	4	5		12
Number of white tiles (W)	8	13					

- b)** Write a formula for calculating the number of white tiles when you know the number of blue tile.
- c)** Katie has 253 white tiles. How many blue tiles will she need to complete her pattern?
Working must be shown.

Q5a) John is putting up a wine rack in a restaurant. He is using simple frames that he can fit together as shown in the diagram below.



Complete the table below

Number of frames (F)	1	2	3	4	5		12
Number of bottles (B)	1	3					

- b)** Write a formula for calculating the number of bottles the wine rack will hold when you know the number of Frames.
- c)** The restaurant needs to hold 75 bottles of wine. How many frames will John need?

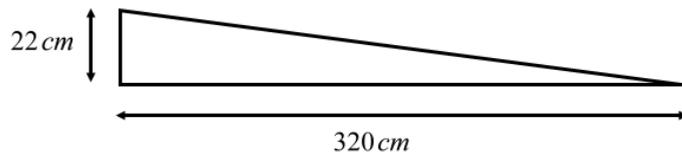
Working must be shown.

Q6

Sean is checking the new disabled access ramp at the council buildings.

Regulations state that the gradient of the ramp must be less than 0.075.

A plan of the ramp is shown below.



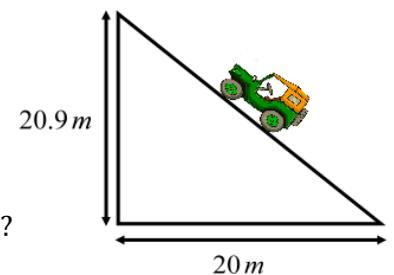
- a) Calculate the gradient of the ramp.
- b) Does the ramp meet the regulations?
Give a reason for your answer.

Q6

A Civil Engineering company has been hired to create a hill to test a new Jeep.

A car manufacturer needs to check that there Jeep can climb a hill with a gradient of 1.1

A plan of the hill is shown below.



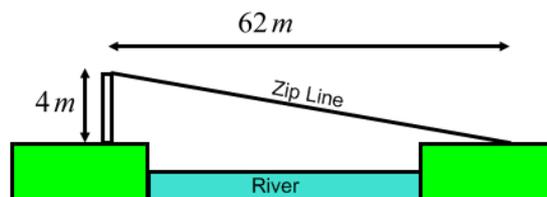
- a) Calculate the gradient of the ramp.
- b) Does the ramp meet the car manufacturer's requirements?
Give a reason for your answer.

Q6

Abbey is helping to set up a zip line across a river for charity.

For safety, the zip line's gradient cannot exceed 0.06.

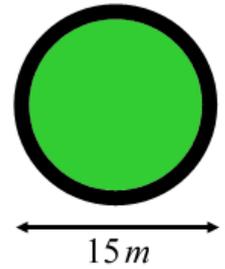
A plan of the proposed Zip line is shown below.



- a) Calculate the gradient of the zip line.
- b) Will the zip line be safe?
Give a reason for your answer.

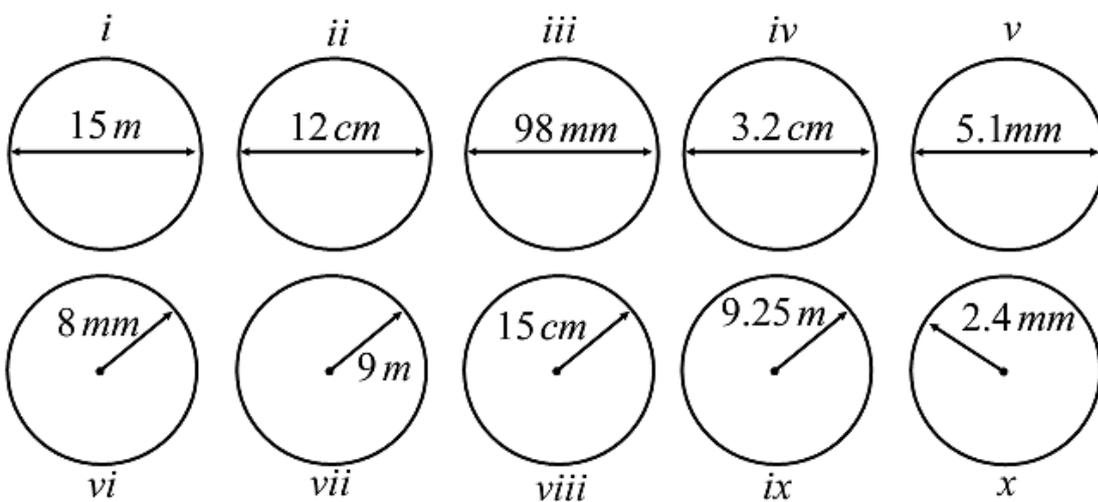
Q7 The diagram below is a plan for a large Garden.

The design is a circular lawn with a diameter of 15 metres, with a path around the outside edge.



- a) Calculate the circumference of the Garden.
- b) Calculate the area of the Garden.

- Q7**
- a) Calculate the circumference of the circles.
 - b) Calculate the area of the circles.



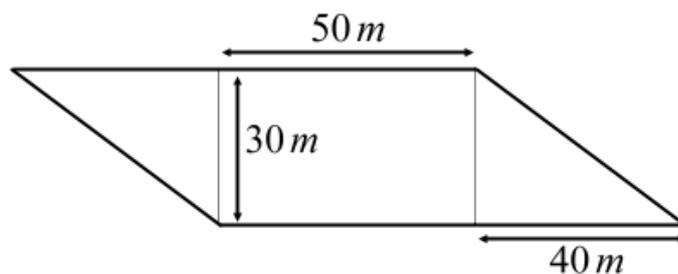
Q8. I Hamburg there is a building shaped like a parallelogram in the harbour.



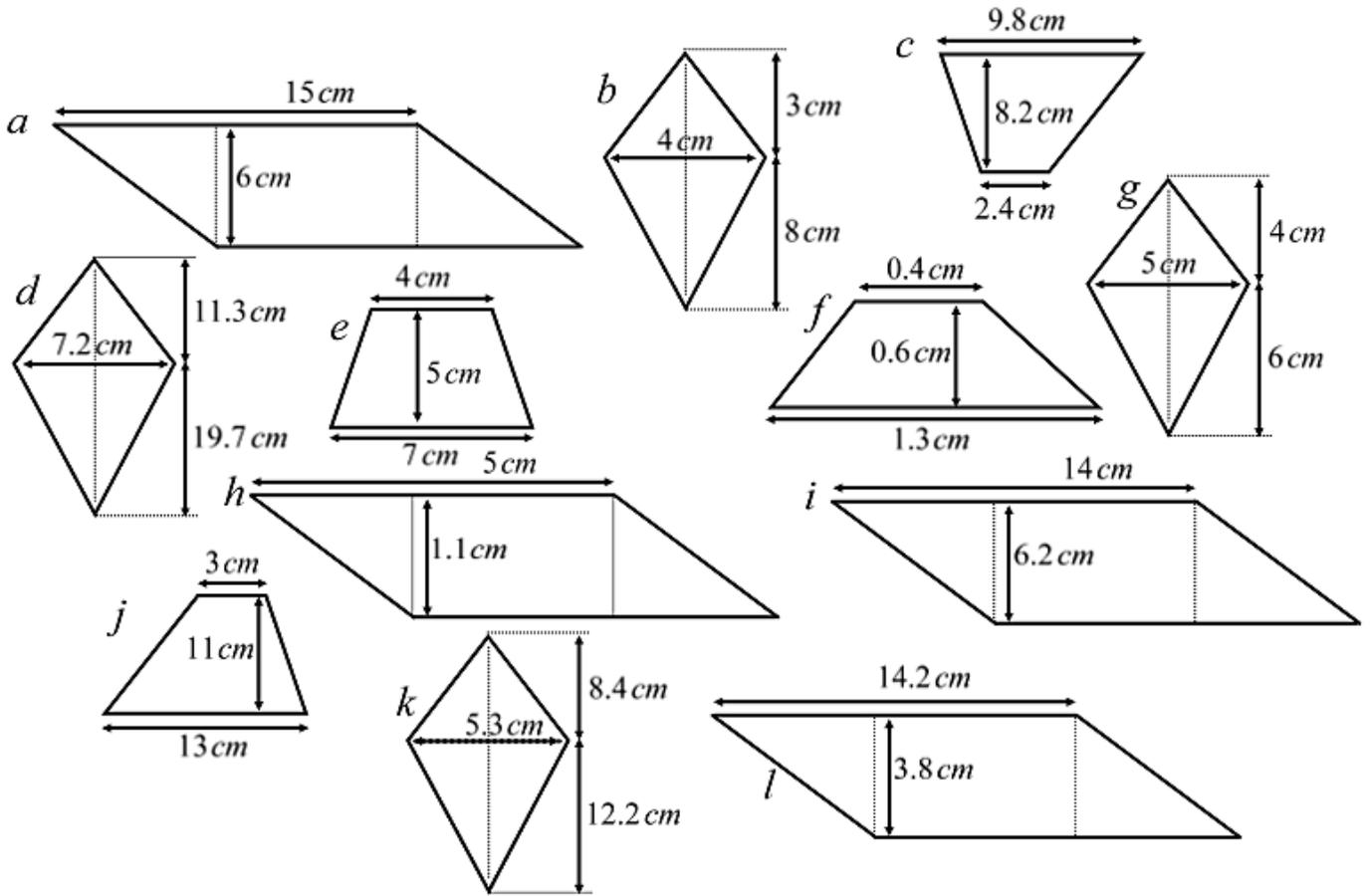
A diagram of the building is shown below.

The parallelogram is made of 2 triangles and a rectangle.

Calculate the area of the glass needed to cover one side on the diagram.



Q8. Calculate the areas of the following quadrilaterals.



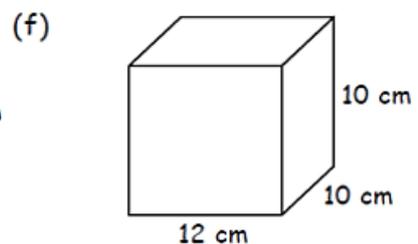
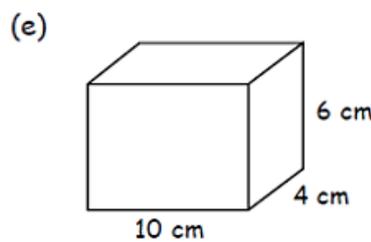
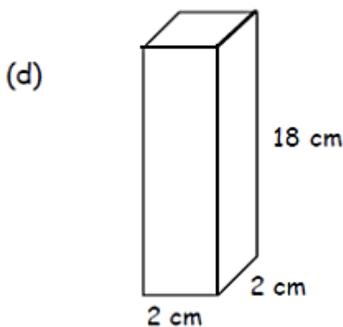
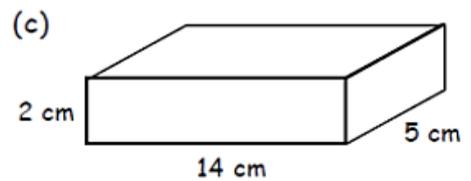
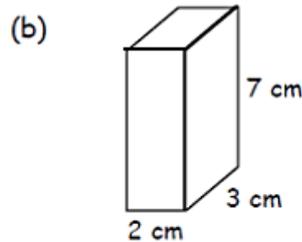
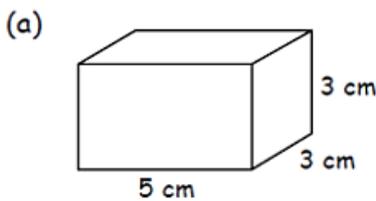
Q9. A box of Frosties is in the shape of a cuboid.

It's dimensions are, Height 30 cm, width 20 cm and depth 6 cm, as shown.

Find the surface area of the box.



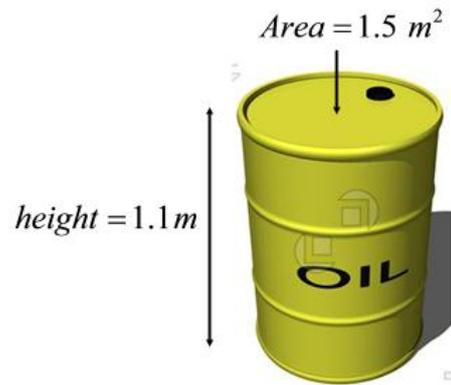
Q9. Calculate the surface area of the following cuboids.



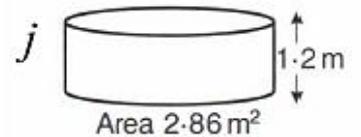
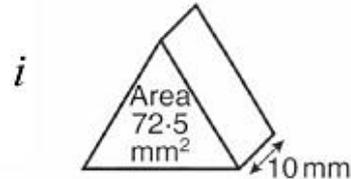
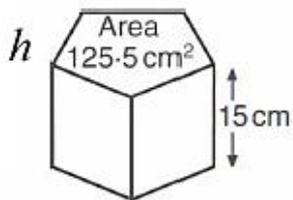
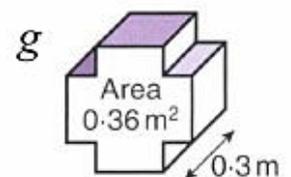
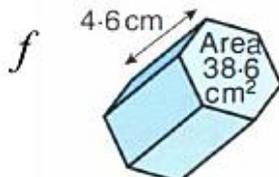
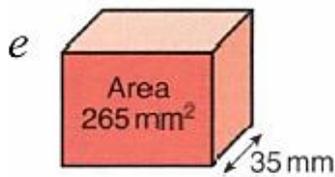
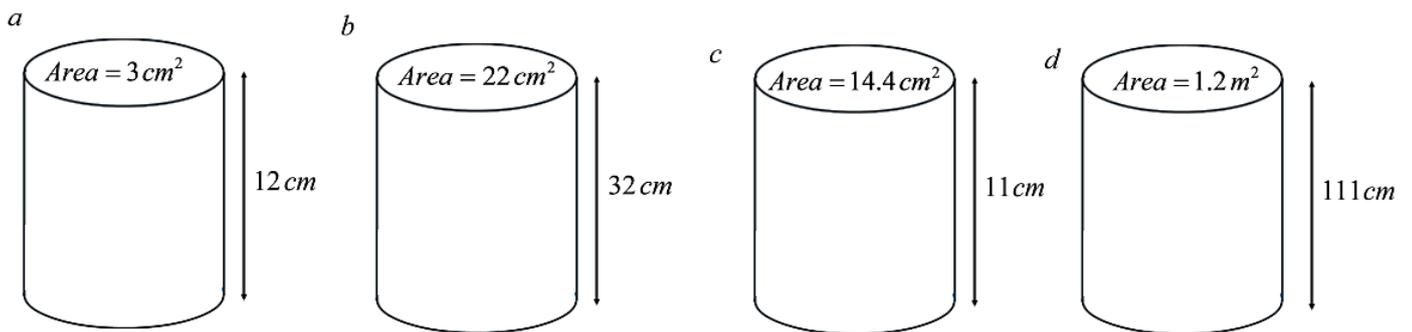
Q10 An oils drum is a cylindrical metal container. The area of the end is 1.5 m^2 as shown.

The height of the drum is 1.1 m .

Calculate the volume of oil that the drum will hold.



Q10 Calculate the volume of the following Cylinders and Prisms.



Q12 Use the following information on the tables to complete the frequency graphs.

a)

85	24	158	492	314	281	399
52	426	241	387	291	159	357

Classes	Tally	Frequency
0-99		
		Total=

b)

2	15	29	45	31	22	27
7	5	41	17	43	39	29

Classes	Tally	Frequency
0-9		
		Total=

c)

127	168	342	289	325	289	202
314	241	282	301	297	260	195

Classes	Tally	Frequency
100-149		
		Total=

d)

5	4275	3108	2974	3991	4920	19
57	2654	1987	952	4001	4527	3129

Classes	Tally	Frequency
0-999		
		Total=

Q13

The table below shows the test scores, as percentages, of 6 Advanced Higher Maths pupils.

32	48	67	78	43	62
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a) Calculate the mean.

b) Calculate the range.

The previous year, a group of 6 pupils recorded:-

- A mean of 49%

- A range of 38.

c) Write 2 comments comparing the results of both sets of pupils.

Q13 The table below shows the times of six 100 m runners in seconds.

11.1	11.4	11.3	11.1	11.2	11.1
------	------	------	------	------	------

a) Calculate the mean.

b) Calculate the range.

3 months after changing their coach, the runners had

- A mean time of 11.0 seconds

- A range of 0.6

c) Write 2 comments comparing the results before and after changing coach.

Q13 The table below shows Stephen's score in rounds of an archery tournament.

357	372	385	401	388	402
-----	-----	-----	-----	-----	-----

- a) Calculate the mean.
- b) Calculate the range.

Between tournaments, Stephen bought himself a new bow.

In the next tournament Stephen had a:

- A mean score of 391 points
 - A range of 37
- c) Write 2 comments comparing the results of the 2 tournaments.

Q13 Jennifer has been keeping track of the mileage her car is getting on a full tank of fuel.

The results are shown in the table below.

401	403	399	397	405	389
-----	-----	-----	-----	-----	-----

- a) Calculate the mean.
- b) Calculate the range.

Jennifer thinks her car is not getting the mileage that it should, so puts it in to the garage for a major service.

When Jennifer records her mileage for the next six tanks full, she has :

- A mean mileage of 403.5 miles
 - A range of 13 miles
- c) Write 2 comments comparing the cars mileage before and after the major service.

Q14 180 people were asked about the make of mobile phone that they owned. The results are shown below.

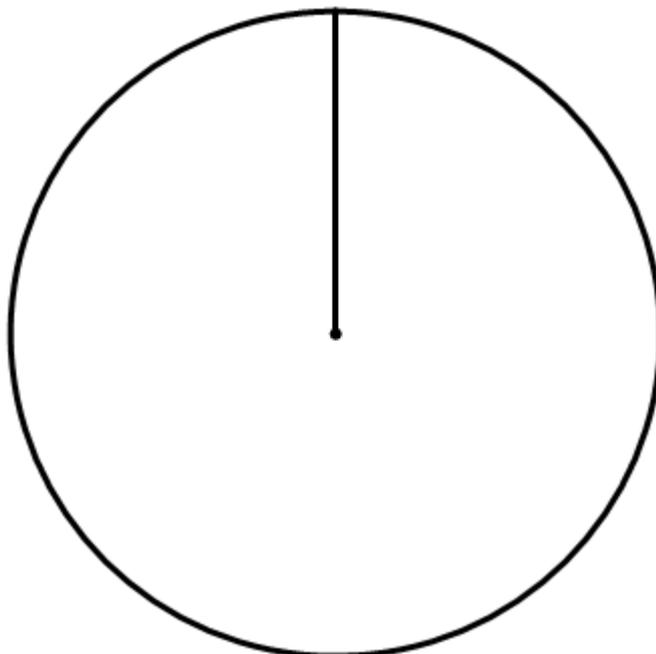
Make of Phone	No. of people
Samsung	72
Apple	65
Sony	43

You have to draw a pie chart to show this graphically.

Fill in the table below and then complete the pie chart.

Make of Phone	No. of people	Angle at centre.
Samsung	72	
Apple	65	
Sony	43	

Now complete the pie chart.



Q14 120 people were asked about which supermarket they prefer. The results are shown below.

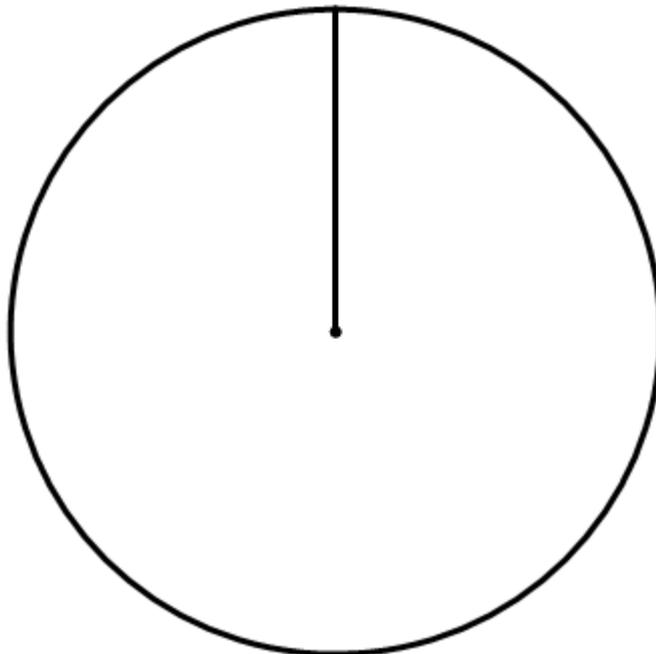
Supermarket	No. of people
Asda	32
Sainsbury's	36
Tesco	52

You have to draw a pie chart to show this graphically.

Fill in the table below and then complete the pie chart.

Supermarket	No. of people	Angle at centre.
Asda	32	
Sainsbury's	36	
Tesco	52	

Now complete the pie chart.



Q14 90 people in a Gym were asked which brand of trainers they preferred to wear.

The results are shown below.

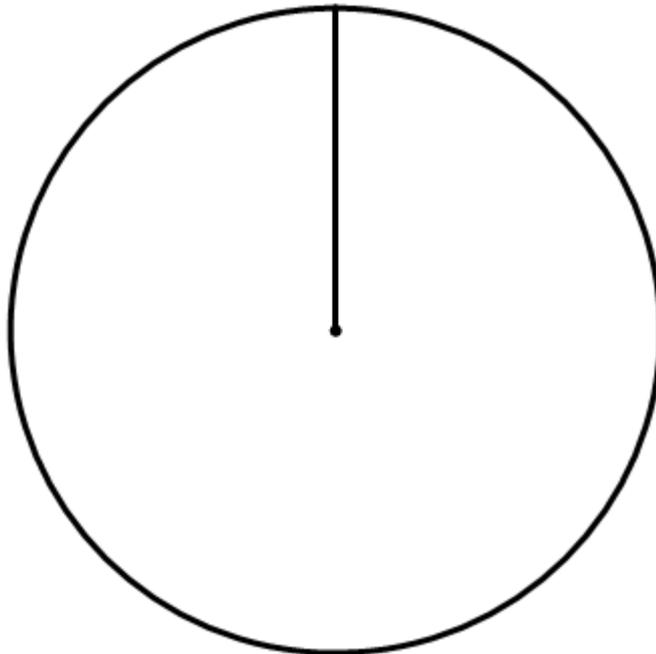
Make of Trainer	No. of people
Adidas	33
Nike	42
Puma	15

You have to draw a pie chart to show this graphically.

Fill in the table below and then complete the pie chart.

Make of Trainer	No. of people	Angle at centre.
Adidas	33	
Nike	42	
Puma	15	

Now complete the pie chart.



Q14 180 people were asked about how they travelled to work every day. The results are shown below.

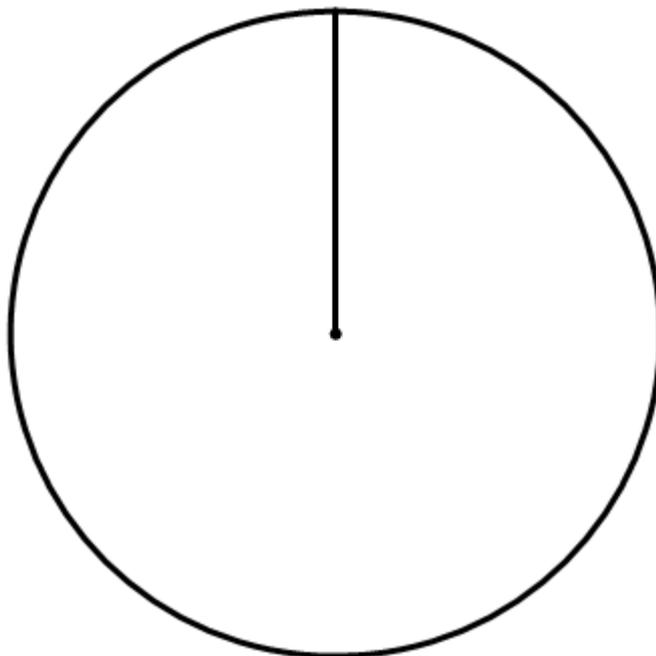
Make of Phone	No. of people
Bus	64
Car	72
Train	44

You have to draw a pie chart to show this graphically.

Fill in the table below and then complete the pie chart.

Make of Phone	No. of people	Angle at centre.

Now complete the pie chart.



- Q15** There are 10 pairs of striped socks, 11 plain socks and 4 spotty socks in a drawer.
What is the probability of choosing a pair of striped socks from the drawer?
- Q15** There are 8 red paperclips, 4 blue paper clips and 9 green paperclips in a tub.
What is the probability of choosing a green paperclip from the tub?
- Q15** There are 4 blue pens, 3 black pens and 5 red pens in a drawer.
What is the probability of choosing a black pen from the drawer?
- Q15** A box of chocolates contains 14 toffee, 12 chocolate and 9 coffee flavoured chocolates.
What is the probability of choosing a toffee flavoured chocolate from the box?
- Q15** A wardrobe contains 12 black shirts, 9 white shirts and 11 blue shirts.
What is the probability of choosing a black shirt from the wardrobe?
- Q15** A jar of loose change contains, 28 five pence pieces, 34 two pence pieces and 50 one pence pieces.
What is the probability of choosing a 2 pence piece from the jar?