S3 Test Revision Booklet

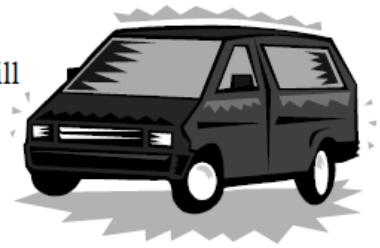
Percentages

Appreciation/Depreciation

1. Calculate the compound interest on
   (a) a sum of £1500 at a rate of 7% p.a. for 4 years.
   (b) a sum of £15 000 at a rate of 5.5% p.a. for 5 years.
   (c) a sum of £120 000 at a rate of 11.2% p.a. for 10 years.

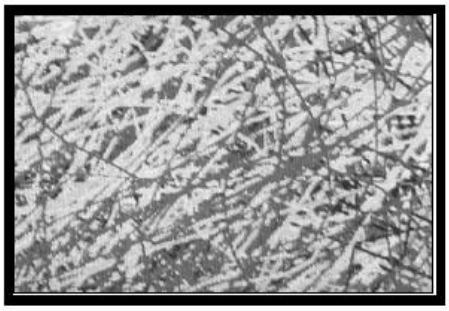
2. A plot of land is valued at £30 000. The value of the land is expected to increase at a rate of 14% p.a. for the next 3 years.
   Find the value of the land in 3 years time.

3. A people carrier cost £11 000 new in 2005. The value of the car will depreciate at a rate of 15% per annum for each of the next 4 years.
   Find the value of the car in 4 years time.
   Give your answer correct to 2 significant figures.



4. On retiring from work Mr. Smith received a lump sum of £52 500.
   He decided to invest his lump sum in a Premium account earning 9.5% interest per annum.
   How much interest would Mr. Smith get after 5 years.

5. A painting valued at £70 000 in 2001 has appreciated at a steady rate of 12% per annum for each of the last 6 years.
   What was the value of the painting in 2007?



7. A van rental company purchases vans costing £22 000 each.
The value of a van depreciates by 30% in its first year and then by 15% in each successive year.
A van is replaced at the end of the year in which its value falls below half its original price.
After how many years will the company replace a van?

8. At 1.00 p.m., a pan containing 1.3 litres of water, is left on the window sill of a house.
The water in the pan evaporates at a rate of 11% per hour.
How much water remained in the pan at 5 p.m.?

9. A geologist measures stalactites in a cave. The longest measured is 235 centimetres long.
If the stalactite grows at a rate of 4.5% every 10 years,
How long will it be in 50 years time?

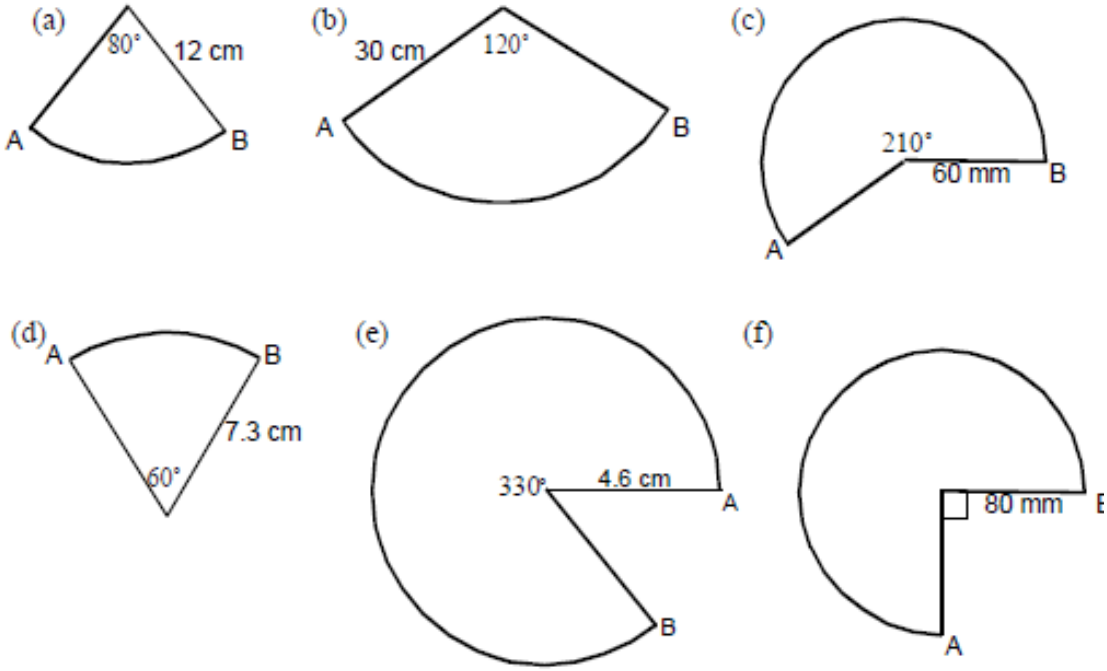
10. The number of flamingos in one lake in Africa is estimated at 45 000.
Due to changes in habitat the number of flamingos is falling at a rate of 8% per annum.
Calculate the number of flamingos there will be in 6 years time.
Give your answer correct to 2 significant figures.

11. The population of the country Liberia was 3.75 million in the year 2007.
If the population is growing at a steady rate of 4.5% per annum, what would the population be in 2015?

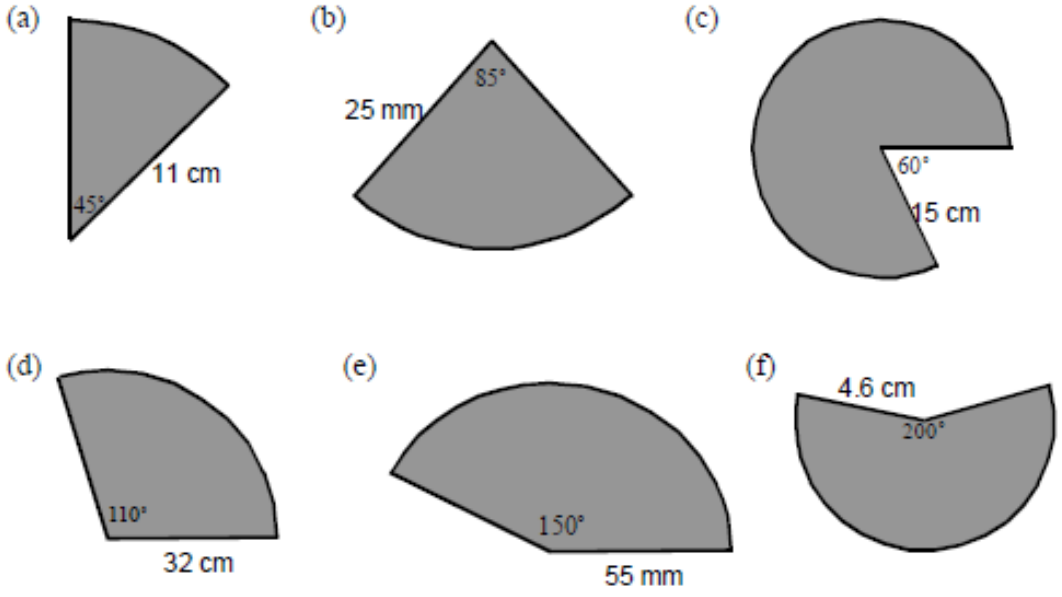
12. Amanda is a secondary school teacher. She earns £32 500 per annum.
Her union agree a 3-year pay deal which will see her get an annual rise of 2.6%.
How much will Amanda earn in 3 years time?

Arc Length/Sector Area

1. Calculate the length of arc AB in each question below



2. Calculate the area of each sector below.



Expanding Brackets

1) Now try expanding these expressions:

a) $5(x + 1)$	b) $7(x + 3)$	c) $x(2 + 4)$
d) $8(x + 2)$	e) $m(x + 6)$	f) $a(x + 9)$
g) $4(x - 4)$	h) $2(x - 3)$	i) $x(x + 2)$
j) $x(x + 6)$	k) $m(x - n)$	l) $x(x - 5)$

2) Now try expanding these expressions:

a) $5(2x + 1)$	b) $7(3x + 3)$	c) $9(2x + 1)$
d) $5(4x + 5)$	e) $m(2x + 4)$	f) $a(2x + 9)$
g) $4(3x - 2)$	h) $4(3x - 3)$	i) $2(4x + a)$
j) $5(2x - 4)$	k) $x(2x + 7)$	l) $3x(x + 4)$

Question 5: Expand and simplify

(a) $5(y + 3) + 2(y + 7)$	(b) $6(2w + 5) + 9(w + 2)$	(c) $3(y - 2) + 4(2y + 5)$
(d) $7(2g + 3) - 5(g + 2)$	(e) $6(x - 2) - 4(x - 8)$	(f) $2(3y - 8) - 5(2y - 1)$
(g) $8(5 + 2m) + 3(5 - 3m)$	(h) $4(w + 7) - 2(2w + 1)$	(i) $9(1 + 2y) + 3(3 - y)$

Factorising

Question 1: Factorise the following expressions

(a) $4x + 6$	(b) $15x + 20$	(c) $9y - 12$	(d) $5x + 15$
(e) $6x - 3$	(f) $4x + 8$	(g) $5y - 25$	(h) $8w + 24$
(i) $10y + 15$	(j) $14w + 21$	(k) $20y - 30$	(l) $27x + 18$

Equations

Question 2 Solve the following equations

(a) $2x + 3 = 9$	(b) $3w - 1 = 14$	(c) $7y + 2 = 30$
(d) $5x + 20 = 35$	(e) $6c - 12 = 48$	(f) $8m - 4 = 20$

stion 1: Solve the following equations

$4x + 1 = 2x + 7$ (b) $5x + 4 = 3x + 16$ (c) $2x + 8 = x + 12$

$7x + 1 = 2x + 46$ (e) $6x - 3 = 2x + 13$ (f) $9x - 10 = 7x + 24$

Statistics

MMMR

1. Calculate the mean, mode, median and range of :

   (a) 1, 6, 9, 5, 11, 8, 5, 13, 5.

   (b) 23, 11, 17, 12, 14, 29, 30, 11, 29, 19.

   (c.) 8, 3, 6, 5, 2, 10, 1, 7, 4, 9.

   (d) 103, 134, 109, 112, 121, 148, 134.

   (e) 9, 1, 7, 3, 5, 4, 3, 5, 4, 8, 2, 9.

2. This list shows the amounts spent by seven families on their holidays :

   £100, £400, £320, £300, £5430, £100, £350.

   (a) Calculate the mean, mode, median and range of these amounts.

   (b) Suggest which of the three averages is the most useful indicator of how much a typical family spends on their holiday.

Quartiles and IQR

Interquartile Range- Practice Worksheet 1

{6,12,8,15,9,7}

Median ☐ Q1 ☐

Q3 ☐ IQR ☐

{5,9,17,25,36,45}

Median ☐ Q1 ☐

Q3 ☐ IQR ☐

{3,14,28,22,5,9}

Median ☐ Q1 ☐

Q3 ☐ IQR ☐

Standard Deviation

1. Fiona checks out the price of a litre of milk in several shops.

The prices in pence are:

49 44 41 52 47 43

a) Find the mean price of a litre of milk.

b) Find the standard deviation of the prices.

2. A group of fifth year students from Alloa High School were asked how many hours studying they did in the week prior to their exams.

The results are shown below.

14 7 9 12 19 10 16 15

(a) Use an appropriate formula to calculate the mean and standard deviation of these times.

3. The Mobile Phone Shop is advertising their five latest mobile phones on their website.

Their prices are:

£120 £135 £75 £235 £185

Use an appropriate formula to calculate the mean and standard deviation of these prices.

(Show all working)

4. The price, in pence per litre, of petrol at 10 city garages is shown below:

84.2	84.4	85.1	83.9	81.0
84.2	85.6	85.2	84.9	84.8

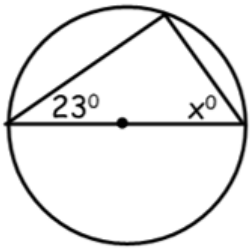
a) Calculate the mean and standard deviation of these prices.

Angles

National 4 Maths Angles in a semi circle

Find the missing angles:

1)



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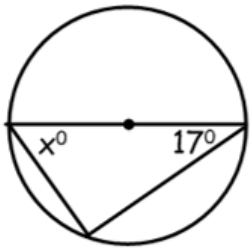

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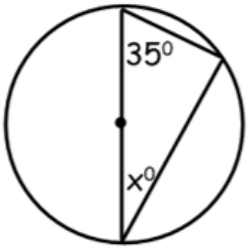

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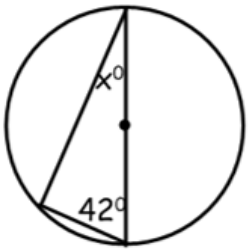
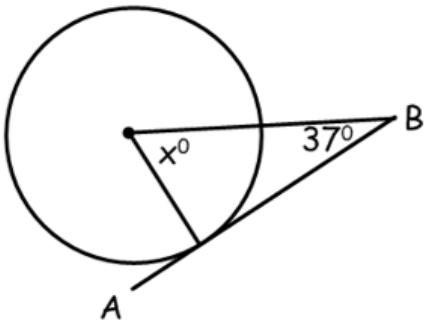


Tangents and circles

For each of the following AB are tangents to the circles.

1)



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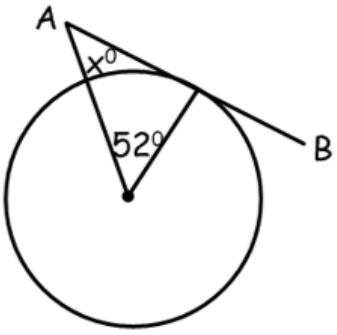
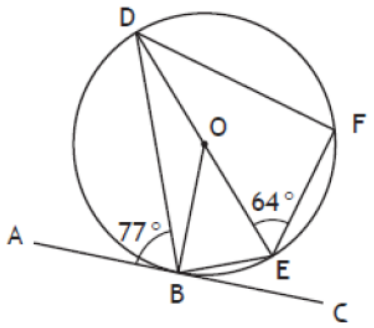


1.



AC is a tangent to the circle, centre O, with point of contact B.

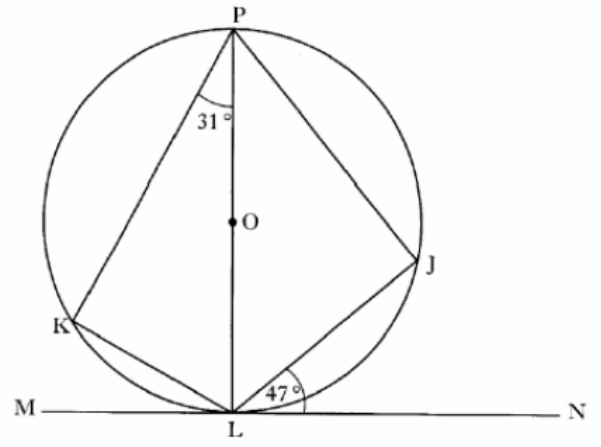
DE is a diameter of the circle and F is a point on the circumference.

Angle ABD is 77° and angle DEF is 64°.

Calculate the size of angle BDF. (3 marks)

N5 Practice Paper C, P2, Q2

4.



The tangent, MN, touches the circle, centre 0, at L.

Angle JLN $= 47°$

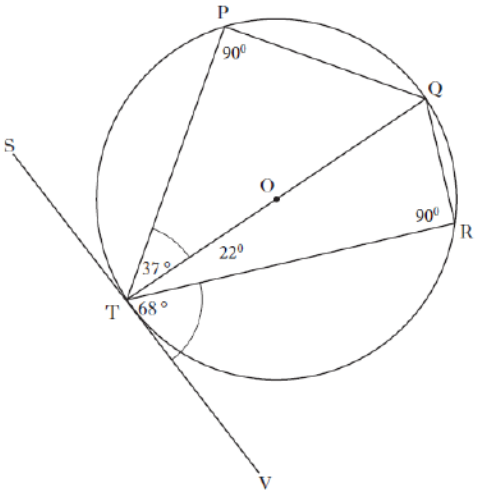
Angle KPL $= 31°$

Find the size of angle JLK

5. The tangent SV touches the circle, centre 0, at T.

- Angle PTQ is $37°$
- Angle VTR is $68°$

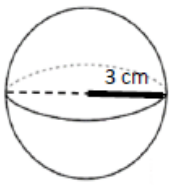
Calculate the size of angle PQR



Volume

Calculate the volume of each:

1.



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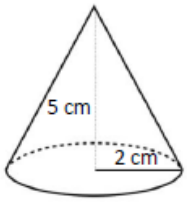

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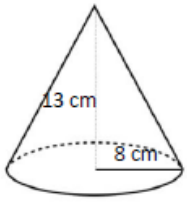
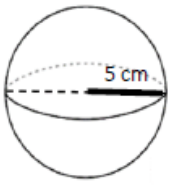
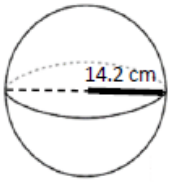


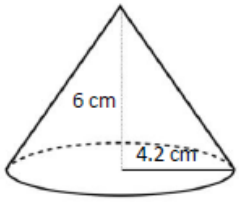
4.



5.



6.

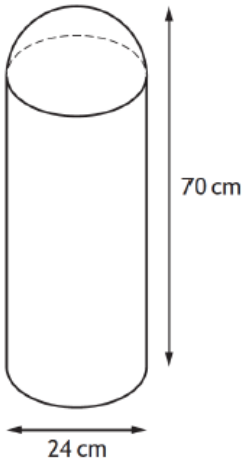


Composite Volume

8. A traffic bollard is in the shape of a cylinder with a hemisphere on top.

The bollard has

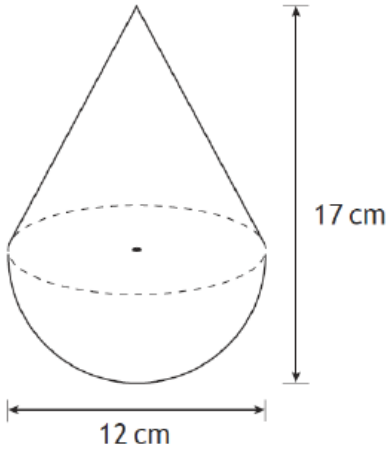
- diameter 24 centimetres
- height 70 centimetres.



Calculate the volume of the bollard.

Give your answer correct to 3 significant figures.

6. A child's toy is in the shape of a hemisphere with a cone on top, as shown in the diagram.



The toy is 12 centimetres wide and 17 centimetres high.

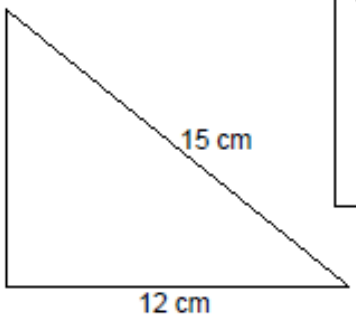
Calculate the volume of the toy.

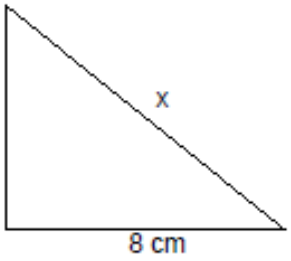
Give your answer correct to 2 significant figures.

Similarity

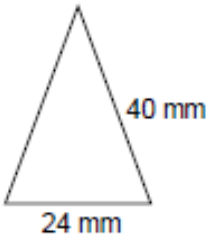
1. In each question below the triangles given are similar. Calculate x in each part.

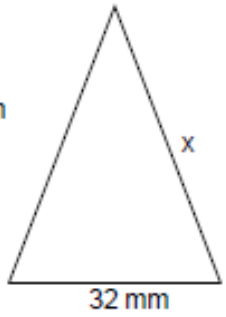
(a)





(b)

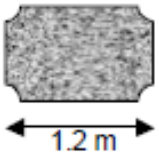


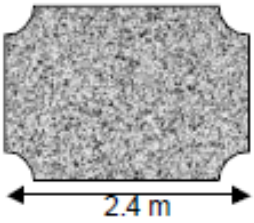


Similar Areas and Volumes

1. Two kitchen worktops are similar in shape.
The area of the smaller worktops is 6.8 m^2.

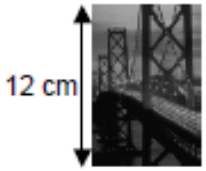
Calculate the area of the larger worktop.

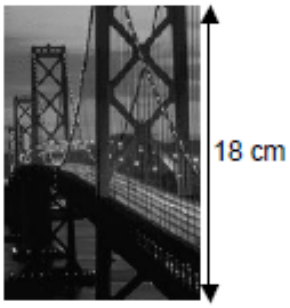




2. A photograph and its enlargement are similar in shape.
The smaller photograph has an area of 56 cm^2.

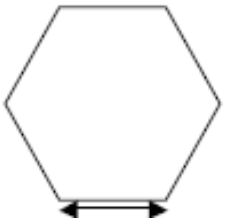
Calculate the area of the larger photograph.

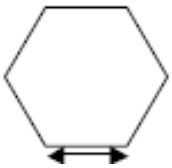




3. Two regular hexagons are mathematically similar in shape.
The larger hexagon has an area of 7350 mm^2.

Find the area of the smaller hexagon.





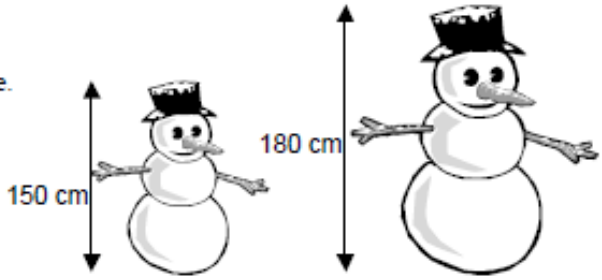
11. The wine glasses shown are similar in shape.
The smaller glass can hold 135 ml of wine.

How much wine can the larger glass hold?

12. Michael and Amanda both build snowmen. The snowmen they build are similar in shape.

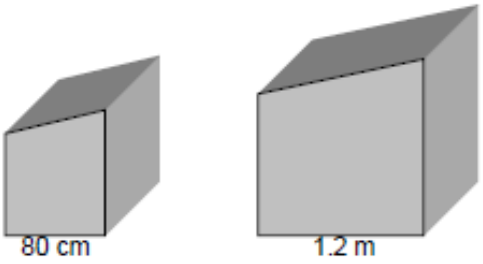
The volume of snow in Michael's snowman is 30 000 cm^3. His snowman is 150 cm tall.

Calculate the volume of snow in Amanda's snowman.



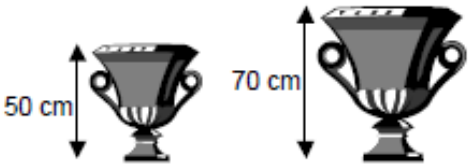
13. Two storage bins are similar in shape. The larger bin has a volume of 1.8 m^3.

Calculate the volume of the smaller bin.



14. Two porcelain vases are similar in shape. The volume of the smaller vase is 1200 cm^3.

Calculate the volume of the larger vase.



15. The pitchers shown opposite are similar. The larger pitcher can hold 864 ml of liquid.

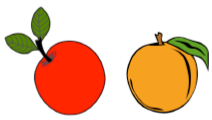
How much liquid can the smaller pitcher hold?

Ratio

Question 1: A drawer contains white socks and black socks only.
The number of white socks to the number of black socks is in the ratio 1:3
There are 12 white socks.

(a) Work out the number of black socks in the drawer.
(b) Work out the total number of socks in the drawer.

Question 2: James has some apples and oranges.
The ratio of apples and oranges is 2:5
He has 15 oranges.
How many apples does James have?



Question 3: The ratio of lemon sweets to strawberry sweets in a tub is 5:3
There are 120 lemon sweets in the tub.
How many strawberry sweets are in the tub?

Question 1:

(a) Share £20 in the ratio 2:3

(b) Share 15cm in the ratio 1:2

(c) Divide £24 in the ratio 1:3

(d) Share 35 sweets in the ratio 4:3

(e) Divide 55g in the ratio 3:2

(f) Divide 54kg in the ratio 1:5

SDT

Question 3: Calculate the average speeds for each of the following.

(a) A car travels 63 miles in 1 hour 30 minutes
(b) A man runs 15 miles in 2 hours 30 minutes
(c) A helicopter flies 238 miles in 3 hours 30 minutes
(d) A car travels 85.5 miles 2 hours 15 minutes
(e) An airplane flies 315 kilometres in 1 hour 45 minutes

Question 7: Work out the distance travelled by each of the following.

(a) A car drives at a speed of 40mph for 1 hour 30 minutes
(b) A bird flies at a speed of 32 kilometres per hour for 1 hour 30 minutes
(c) A lorry travels for 2 hours 30 minutes at a speed of 52 mph
(d) A F1 race car drives for 1 hour 15 minutes at a speed of 124 mph
(e) A helicopter flies at a speed of 104 mph for 1 hour 45 minutes
(f) A car drives at a speed of 58 mph for 3 hours 15 minutes
(g) A man runs at 6 mph for 1 hour 24 minutes

Question 10: Calculate how long each journey lasts.
Give each answer in hours and minutes.

(a) A car travels 100 miles at a speed of 40mph.
(b) A lorry travels 90 miles at a speed of 60 mph.
(c) A bus drives at a speed of 48mph and covers a distance of 60 miles.
(d) A helicopter flies 105 kilometres at a speed of 140 km/h
(e) A bird covers a distance of 95 miles at a speed of 20 miles per hour.
(f) A car travels at 50 mph and covers a distance of 110 miles.
(g) A lorry drives a distance of 452.4 kilometres at a speed of 52 km/h.

Money

Work out how much it would cost you to buy each item paying monthly ***and*** *what the difference is between this and the cash price.*

1. Cash Price £500

Or

Deposit £50
Plus
9 monthly payments
of £55.

2. Cash Price £ 430

Or

Deposit £100
Plus
12 monthly payments
of £30.

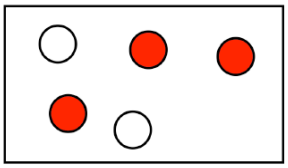
Country	Rate		
Mainland Europe	£1	=	€1·16
USA	£1	=	$1·28
Russia	£1	=	38·60 Rubles
Poland	£1	=	5·20 Zloty

11) Irene is going to Paris. She takes £150 with her which she changes into Euros. She spends €120.
How much does she have left in Euros?

12) Before flying to Poland Viv exchanges £400. While she is in Poland she spends 1400 Zloty.
How much will she have left when she changes it back into £s?

Probability

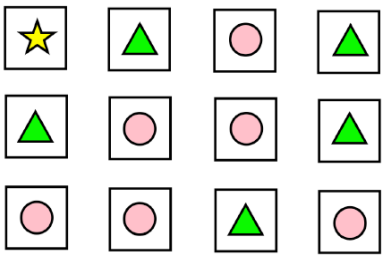
Question 1: Theo has 3 red sweets and 2 white sweets.
He picks a sweet at random.



(a) Write down the probability that Theo picks a red sweet.

(b) Write down the probability that Theo picks a white sweet.

Question 2: Leah has 12 cards, each with a shape on it.
She takes a card at random.



(a) What is the probability that Leah takes a card with a star on it?

(b) What is the probability that Leah takes a card with a triangle on it?

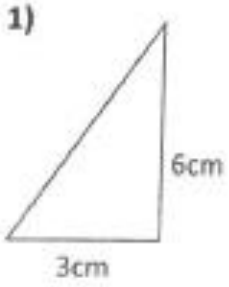
(c) What is the probability that Leah takes a card with a circle on it?

Gradient

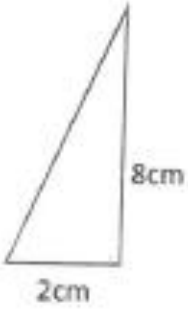
Exercise 1

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

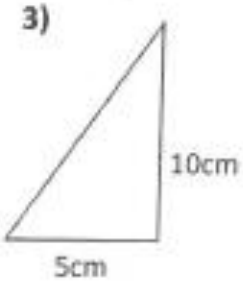
1)



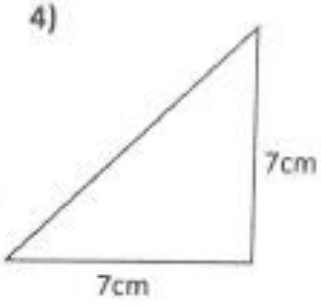
2)



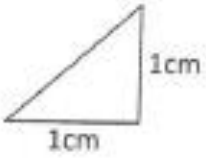
3)



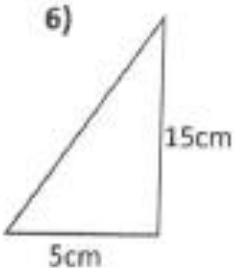
4)



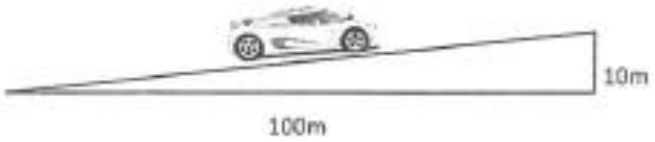
5)



6)



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?