

KS3 MATHEMATICS

10 4 10

Level 7 Questions

Day 1

1. What number is five cubed?
2. A circle has radius r .
What is the formula for the area of the circle?
3. Jenny and Mark share some money in the ratio two to three. Jenny's share is one hundred and ten pounds.
How much is Mark's share?
4. The net of a triangular prism is made from triangles and rectangles.
How many of each shape are needed?
5. Multiply minus six by minus two.

Percentage change

- (a) One calculation below gives the answer to the question

What is 70 increased by 9%?

Tick (✓) the correct one.

70×0.9

70×1.9

70×0.09

70×1.09

1 mark

Choose one of the other calculations.

Write a question **about percentages** that this calculation represents.

calculation chosen:

question it represents:

1 mark

Now do the same for one of the remaining two calculations.

calculation chosen:

question it represents:

1 mark

- (b) Fill in the missing decimal number.

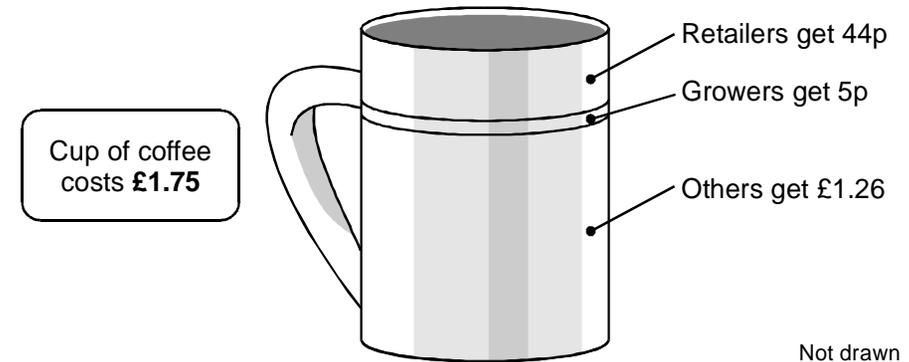
To decrease by 14%, multiply by

1 mark

Coffee

A cup of coffee costs £1.75

The diagram shows how much money different people get when you buy a cup of coffee.



Not drawn accurately

- (a) Complete the table to show what **percentage** of the cost of a cup of coffee goes to retailers, growers and others.

Show your working.



1 mark

Retailers	%
Growers	%
Others	%

2 marks

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Level 7 Questions

Day 2

Mental Arithmetic Questions

1. What is one third of three-quarters of one hundred?

.....

2. I'm thinking of a number. I call it n .
I square my number and then add 4.
Write an expression to show the result.

.....

3. Twenty- one out of thirty-six pupils said they
watched Top of the Pops.
What angle on a pie chart would show this?

.....

4. There are seven red and three blue balls in a bag.
I am going to take a ball out of the bag at random.
What is the probability that the ball will be blue?

.....

5. Write a multiple of three that is bigger than one
hundred.

.....

Powers

- (a) Write the values of k and m .

$$64 = 8^2 = 4^k = 2^m$$



$$k = \dots\dots\dots$$

$$m = \dots\dots\dots$$

2 marks

- (b) Complete the following:

$$2^{15} = 32\,768$$



$$2^{14} = \dots\dots\dots$$

1 mark

Squares

Some numbers are **smaller** than their squares.

For example: $7 < 7^2$

Which numbers are **equal to** their squares?



2 marks

Mental Arithmetic Questions

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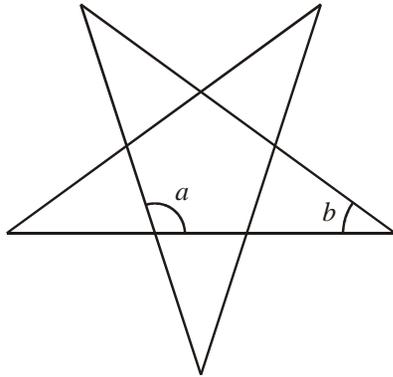
Day 3

1. I am thinking of a number. I call it n .
I double my number then I subtract three.
Write an expression to show the result.
2. What percentage of fifty pounds is thirty-five pounds?
3. On average, the driest place on earth gets only nought point five millimetres of rain every year.
In total, how much rain would it expect to get in twenty years?
4. To the nearest whole number, what is the square root of eighty-three point nine?
5. It takes me one and a half minutes to swim one length of the pool.
How many lengths can I swim in fifteen minutes

Pentagonal pyramid

The diagram shows the net for a right-pyramid with a regular pentagon as its base.

The net is constructed using five straight lines.



(a) Without measuring, explain why angle **a** must be 108°



(b) Calculate the size of angle **b**.

You **must** show your working.

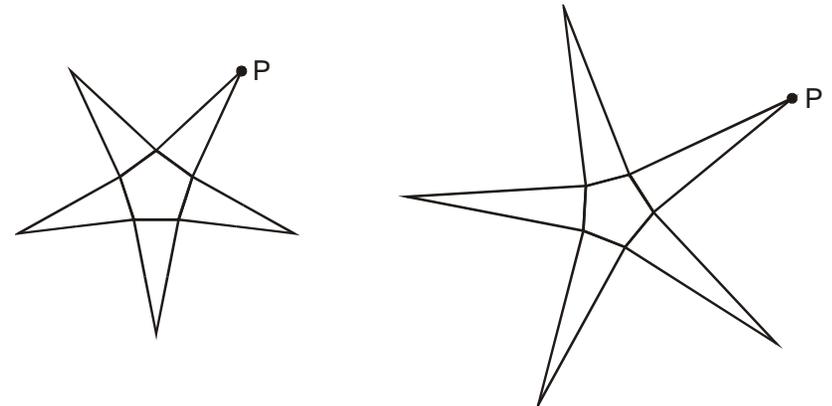


.....^o

1 mark

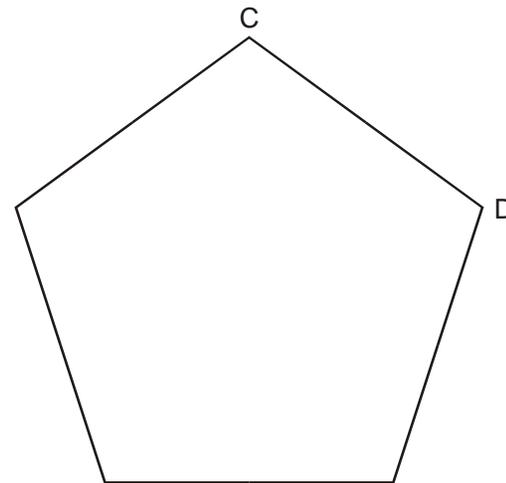
1 mark

(c) On these nets, the point marked P lies on the perpendicular bisector of a side of the pentagon.

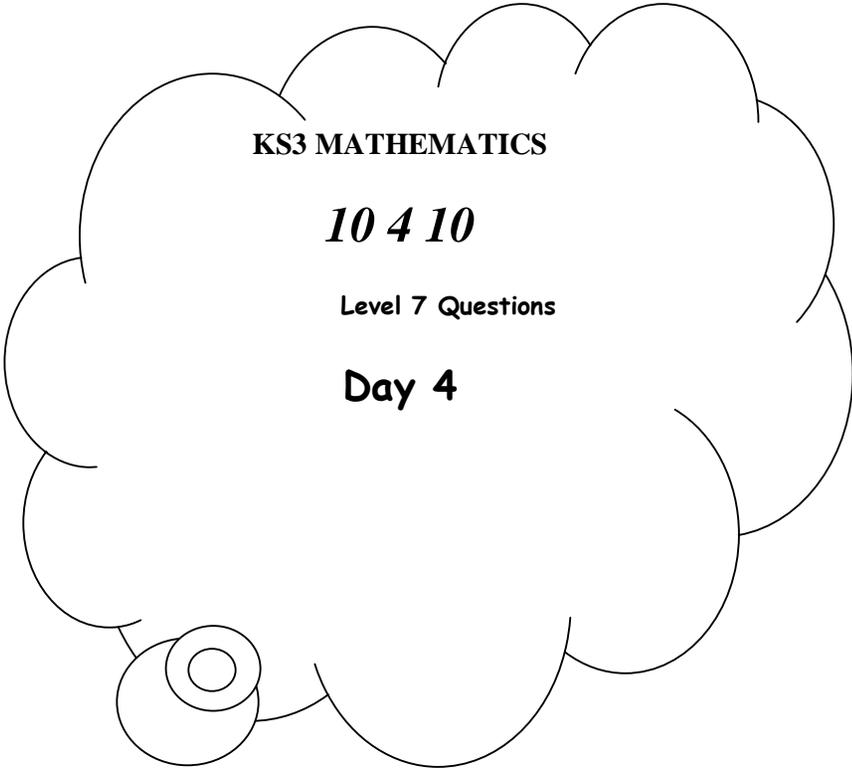


On side CD of the regular pentagon below, use compasses and a straight edge to **construct** the **perpendicular bisector**.

You **must** leave in your construction lines.



2 marks



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Day 4

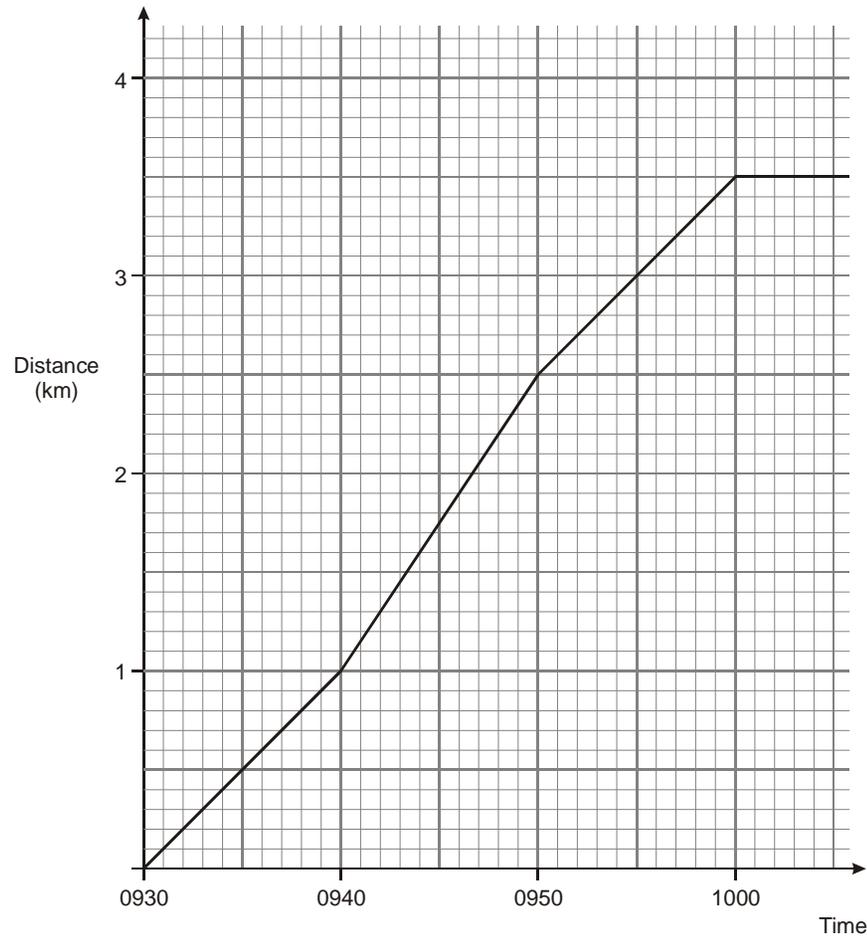
Mental Arithmetic Questions

1. Tariq won one hundred pounds in a maths competition. He gave two-fifths of his prize money to charity. How much of his prize money, in pounds, did he have left?
2. What is three point nine divided by two?
3. The instructions for a fruit drink say to mix one part blackcurrant juice with four parts water. I want to make one litre of this fruit drink. How much blackcurrant juice should I use? Give your answer in millilitres.
4. What is half of two-thirds?
5. The population of the United Kingdom is about fifty-nine million. Write this number in figures.

Running machine

Kali uses a running machine to keep fit.

The simplified distance-time graph shows how she used the machine during one run.



Use the graph to answer these questions.

- (a) Between 0930 and 0940, what was her speed in **kilometres per hour**?

..... km/h

1 mark

- (b) Throughout the run, for how many **minutes** did she travel at this speed?



..... minutes

1 mark

- (c) At 0940, she increased her speed.
By how many kilometres per hour did she increase her speed?



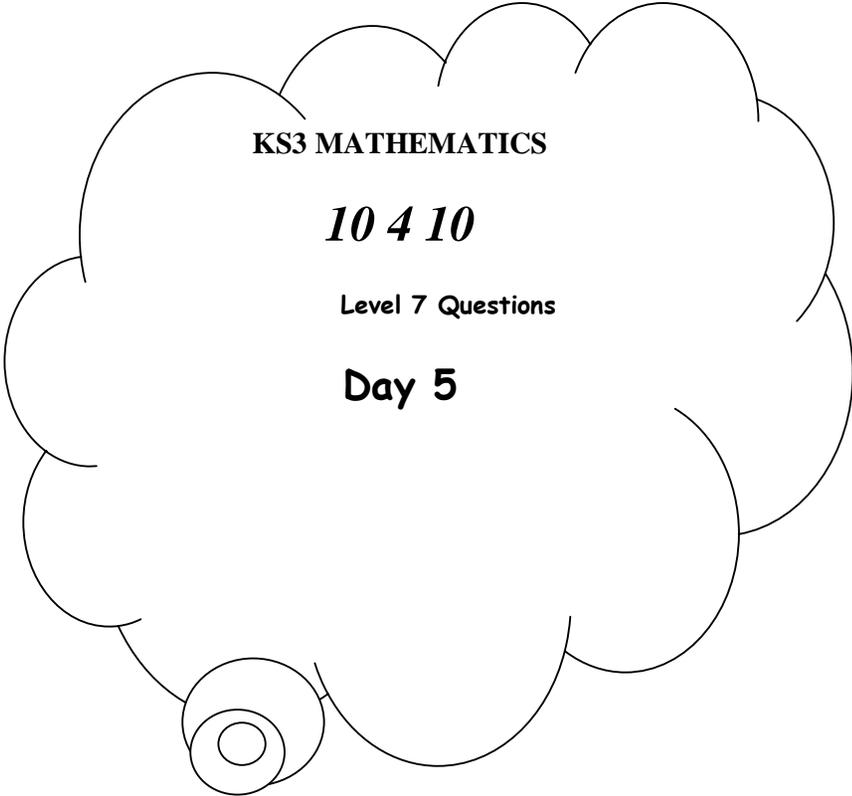
..... km/h

1 mark

- (d) On another day, Kali started running at **0935**.
She ran for **24 minutes** at a constant speed of **10 kilometres per hour**.

Show this information on the graph on the opposite page.
Show any working in the space below.

2 marks



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Level 7 Questions

Day 5

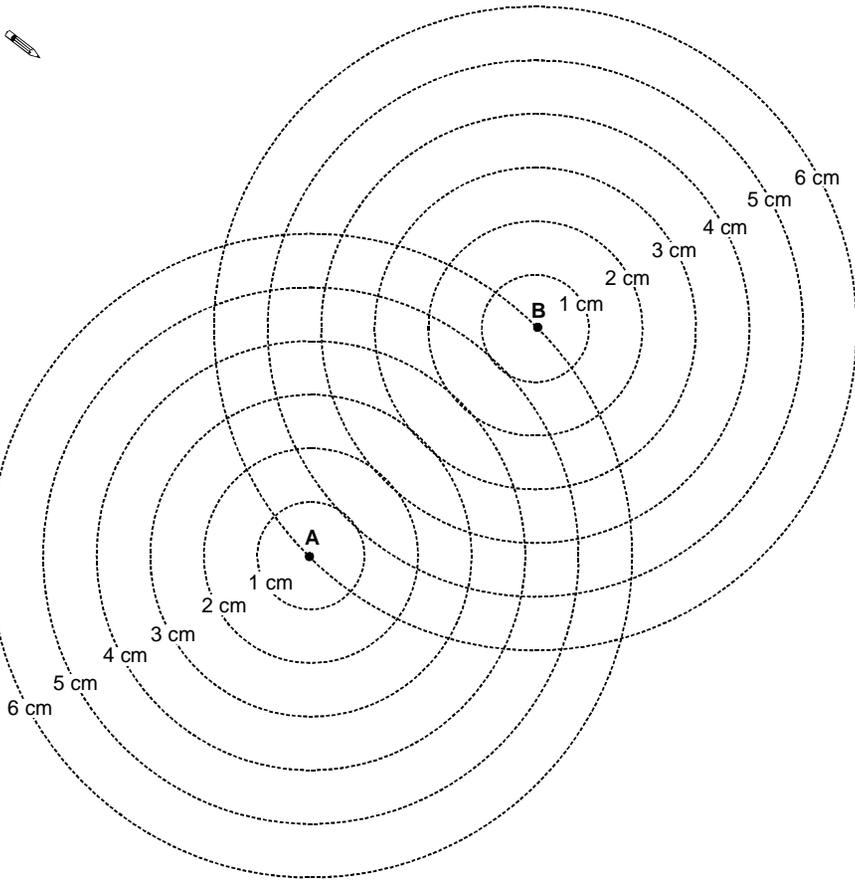
Mental Arithmetic Questions

1. What is three-fifths of forty pounds?
2. The longest bone in the human body is in the leg. The average length of this bone in a man is fifty centimetres. In a woman it is ten per cent less.
What is the average length of this bone in a woman?
3. Using three as an approximation for pi, what is the area of a circle with radius five centimetres?
4. I am thinking of a two-digit number that is a multiple of eight.
The digits add up to six.
What number am I thinking of?
5. I am thinking of a number. I call it n . I add five to my number.
Write an expression to show the result.

Loci

The diagram below shows two points A and B that are 6 cm apart.

Around each point are six circles of radius 1 cm, 2 cm, 3 cm, 4 cm, 5 cm and 6 cm. Each circle has either A or B as its centre.



- (a) On the diagram, mark with a cross any points that are 4 cm away from A **and** 4 cm away from B.

1 mark

- (b) Now draw the locus of **all** points that are the **same distance** from A as they are from B.

1 mark

Rearrange

The subject of the equation below is p

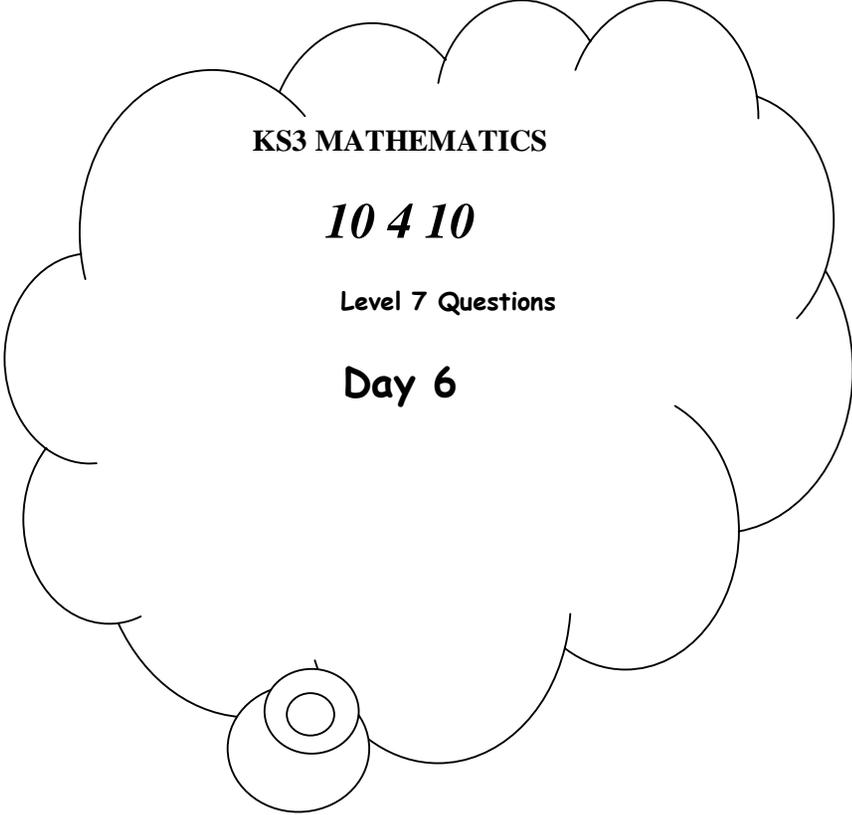
$$p = 2(e + f)$$

Rearrange the equation to make e the subject.



$$e =$$

2 marks



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Level 7 Questions

Day 6

Mental Arithmetic Questions

1. Five percent of a number is 8. What is the number?
2. A fair spinner has eight equal sections with a number on each section. Five of them are even numbers. Three are odd numbers.
What is the probability that I spin an even number?
3. I can make a three-digit number from the digits two, three and four in six different ways.
How many of these three-digit numbers are even?
4. What is the volume of a cuboid measuring five centimetres by six centimetres by seven centimetres?
5. What is the remainder when you divide three hundred by twenty-nine?

Evens or Odds

(a) m is an **odd** number.

Which of the numbers below must be even, and which must be odd?

Write 'odd' or 'even' under each one.



$2m$	m^2	$3m - 1$	$(m - 1)(m + 1)$

2 marks

(b) m is an **odd** number.

Is the number $\frac{m+1}{2}$ odd, or even, or is it not possible to tell?

Tick (✓) the correct box.



odd		even		not possible to tell	
-----	--	------	--	----------------------	--

Explain your answer.



1 mark

Factors again

(a) Ring the expression below that is the same as $y^2 + 8y + 12$



$(y + 3)(y + 4)$

$(y + 7)(y + 1)$

$(y + 2)(y + 6)$

$(y + 1)(y + 12)$

$(y + 3)(y + 5)$

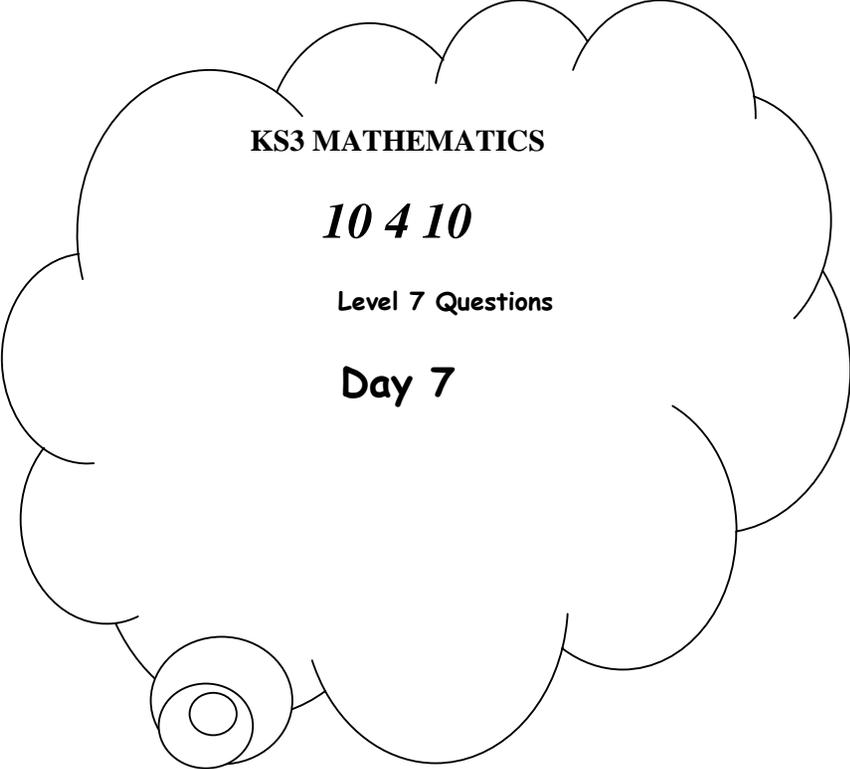
1 mark

(b) Multiply out the expression $(y + 9)(y + 2)$

Write your answer as simply as possible.



2 marks



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Level 7 Questions

Day 7

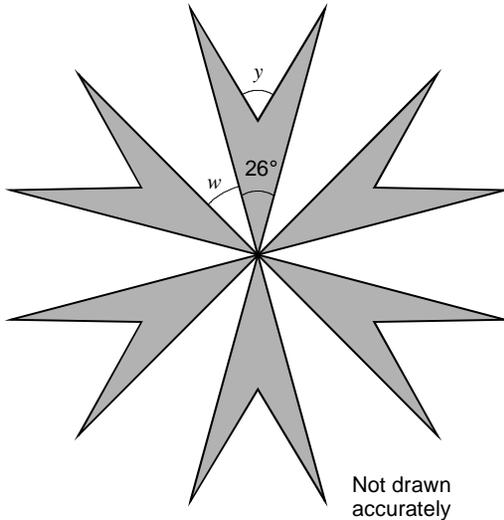
Mental Arithmetic Questions

1. Twenty-five per cent of a number is seven.
What is the number?
2. There are fourteen girls and thirteen boys in a class.
What is the probability that a pupil chosen at random will be a girl?
3. The first even number is two.
What is the hundredth even number?
4. The mean of two numbers is 8. One of the numbers is two. What is the other number?
5. How many edges are there on a square based pyramid?

Angles

This pattern has rotation symmetry of order 6

- (a) What is the size of angle w ?
Show your working.

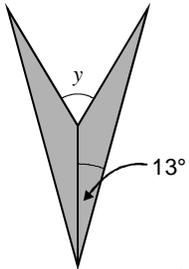


..... °

2 marks

- (b) Each quadrilateral in the pattern is made from two congruent **isosceles** triangles.

What is the size of angle y ? Show your working



Not drawn accurately

.....

2 marks

Television

A headteacher wants to choose a pupil from year 7, 8 or 9 to appear on television.

The headteacher gives each pupil **one** ticket.

Then she will select the winning ticket at random.

The table shows information about the ticket used.

	Colour of the ticket	Numbers used
Year 7	red	1 to 80
Year 8	blue	1 to 75
Year 9	yellow	1 to 90

- (a) What is the probability that the winning ticket will be **blue**?

1 mark

- (b) What is the probability that the winning ticket will show number **39**?

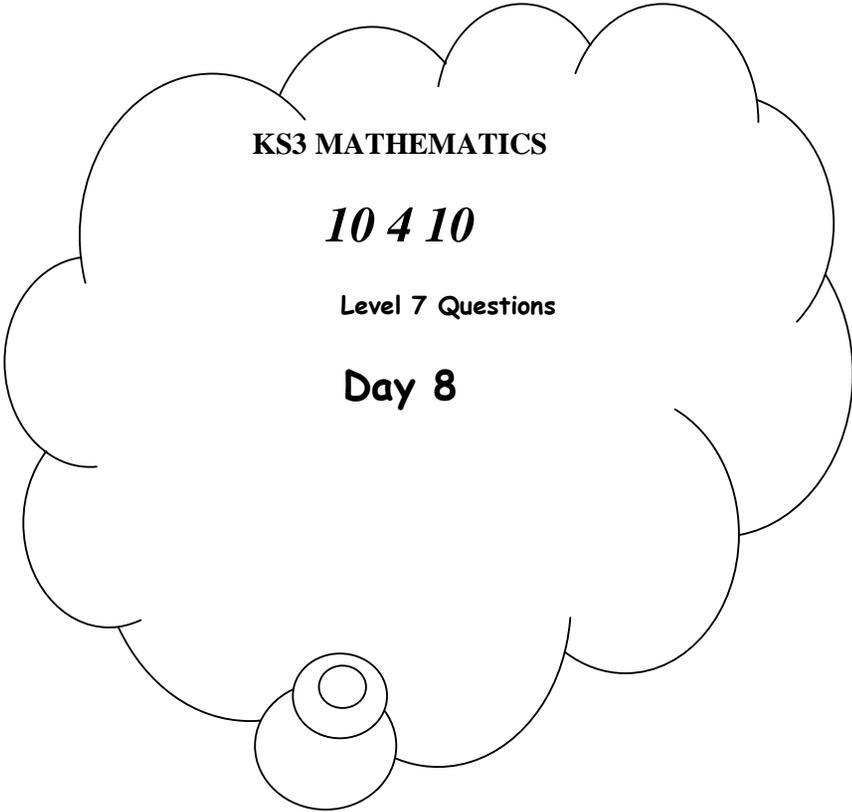
1 mark

- (c) The headteacher selects the winning ticket at random. She says:

'The winning ticket number is 39'.

What is the probability that this winning ticket is blue?

1 mark



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Day 8

Mental Arithmetic Questions

1. Multiply 8.7 by 2
2. A bat flies at an average speed of 32 kilometres an hour. At this speed, how far will it fly in 15 minutes?
3. Multiply the brackets $(2x + 1)(x - 1)$
4. I'm thinking of a number. I call it t . I half it and subtract five. Write an expression to show the result.
5. The first odd number is 1. What is the hundredth odd number?

Owls

Owls eat small mammals.
They regurgitate the bones and fur in balls called pellets.

The table shows the contents of 62 pellets from long-eared owls.

Number of mammals found in the pellet	1	2	3	4	5	6
Frequency	9	17	24	6	5	1

- (a) Show that the **total** number of mammals found is **170**

1 mark

- (b) Calculate the **mean** number of mammals found in each pellet.
Show your working and give your answer correct to 1 decimal place.

.....

2 marks

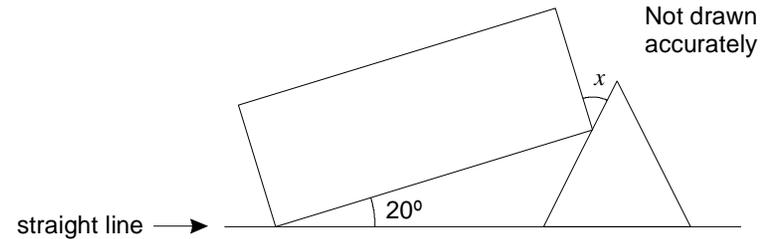
- (c) There are about **10 000** long-eared owls in Britain.
On average, a long-eared owl regurgitates **1.4 pellets** per day.

Altogether, how many **mammals** do the 10 000 long-eared owls eat in **one day**?
Show your working and give your answer to the nearest thousand.

.....2 marks

Rectangle rest

The diagram shows a **rectangle** that just touches an **equilateral triangle**.

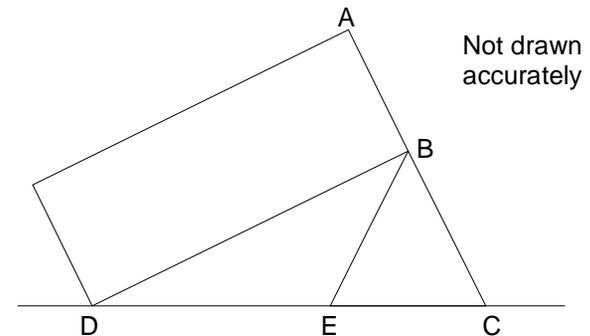


- (a) Find the size of the angle marked x
Show your working.

.....°

2 marks

- (b) Now the rectangle just touches the equilateral triangle so that **ABC** is a **straight line**.

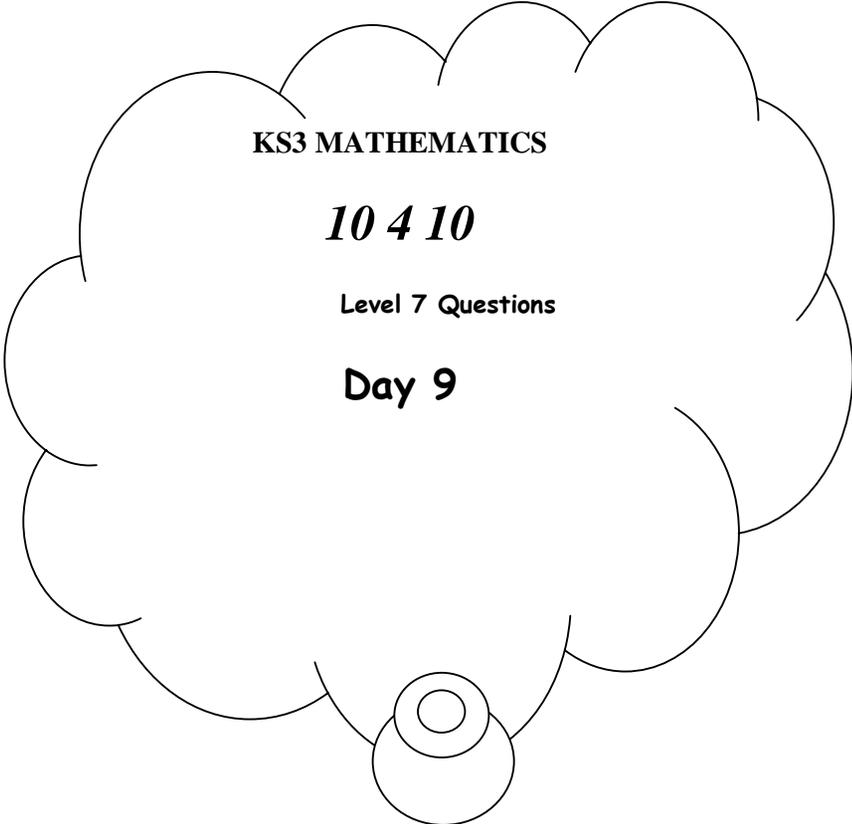


Show that triangle BDE is isosceles.

2 marks

Mental Arithmetic Questions

1. Add four to minus five.
2. What number should you add to minus three to get the answer five?
3. How many nought point fives are there in ten?
4. On average, the driest place on earth gets only nought point five millimetres of rain every year. In total, how much rain would it expect to get in twenty years?
5. What is the sum of the angles in a rhombus?



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Day 9

True or false

(a) Pupils started to solve the equation $6x + 8 = 4x + 11$ in different ways.

For each statement below, tick (✓) True or False.



$$6x + 8 = 4x + 11$$

so $14x = 15x$

True False

$$6x + 8 = 4x + 11$$

so $6x + 4x = 11 + 8$

True False

$$6x + 8 = 4x + 11$$

so $6x = 4x + 3$

True False

$$6x + 8 = 4x + 11$$

so $2x + 8 = 11$

True False

$$6x + 8 = 4x + 11$$

so $2x = 3$

True False

$$6x + 8 = 4x + 11$$

so $-3 = -2x$

True False

3 marks

(b) A different pupil used trial and improvement to solve the equation $6x + 8 = 4x + 11$

Explain why trial and improvement is not a good method to use.

1 mark

Giraffe

A book gives this information:

A baby giraffe was born that was 1.58 metres high.
It grew at a rate of 1.3 centimetres **every hour**.

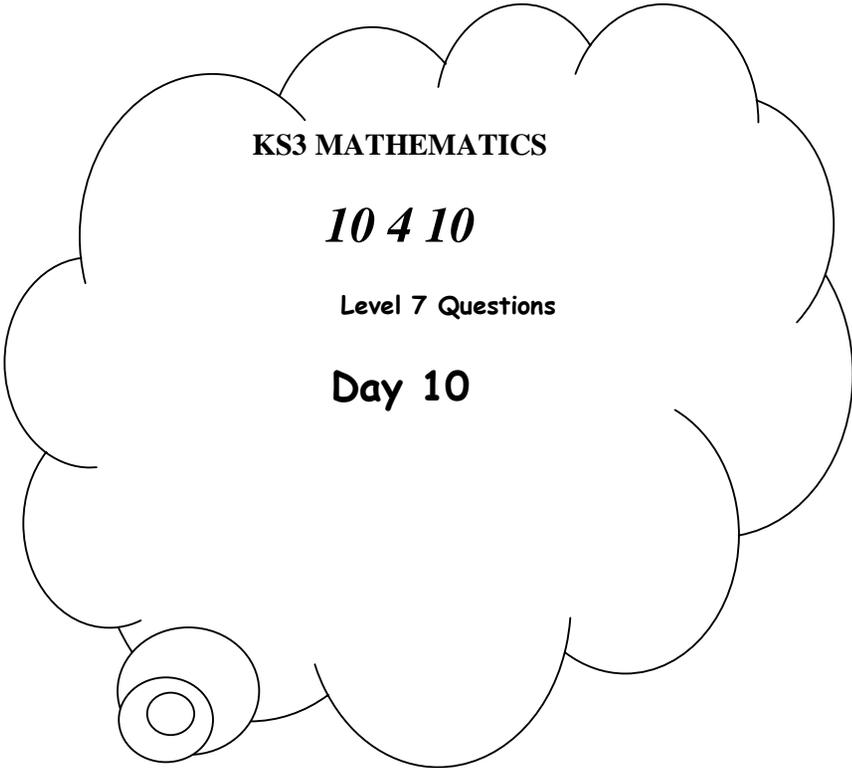
Suppose the baby giraffe continued to grow at this rate.

About how many days old would it be when it was **6 metres** high?
Show your working.



..... days old

3 marks



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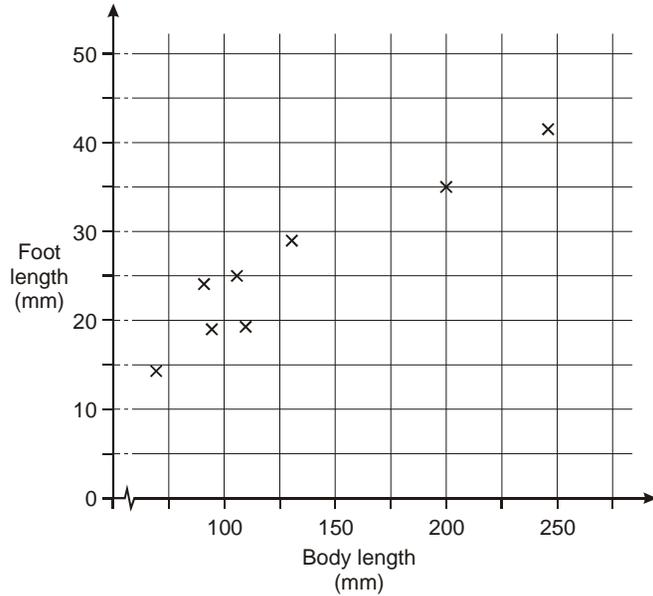
Day 10

Mental Arithmetic Questions

1. It takes some-one one and a half minutes to swim the length of the pool. How many lengths can I swim in 15 minutes?
2. Multiply minus eight by minus three.
3. If $4x + 3 = 23$, what is the value of x ?
4. I have a fair eight sided dice numbered 12 to 19. What is the probability that I will throw a prime number?
5. What must I multiply n squared by to get n cubed?

Rodents

The scatter graph shows the average body length and average foot length of different species of rodents.



- (a) What does the scatter graph tell you about the **type of correlation** between the body length and foot length for these rodents?

1 mark

- (b) Draw a **line of best fit** on the scatter graph.

1 mark

- (c) If body length increased by **50 mm**, by approximately how many millimetres would you expect foot length to increase?

Ring the correct value below.

2 **7** **15** **50**

1 mark

- (d) An animal has a body length of **228 mm**, and foot length of **22 mm**.

Is this animal likely to be one of these species of rodents?

Tick (✓) Yes or No.

Yes No

Explain your answer.

1 mark

Centenarians

People who live to be 100 years old are called centenarians.

In 1998 there were **135 000** centenarians.

The **ratio** of **male** to **female** was **1 : 4**

How many **female** centenarians were there in 1998?

Show your working.



.....

2 marks