Ma

KEY STAGE
3

TIER
6–8

Year 9 mathematics test

Paper 2
Calculator allowed

First name _____

Last name _____

Class _____

Date _____

Please read this page, but do not open your booklet until your teacher tells you to start. Write your name, the name of your class and the date in the spaces above.

Remember:

- The test is 1 hour long.
- You **may** use a calculator for any question in this test.
- You will need: pen, pencil, rubber, ruler and a scientific or graphic calculator.
- Some formulae you might need are on page 2.
- This test starts with easier questions.
- Try to answer all the questions.
- Write all your answers and working on the test paper – do not use any rough paper. Marks may be awarded for working.
- Check your work carefully.
- Ask your teacher if you are not sure what to do.

For marking use only

Total marks	

Instructions

Answers

This means write down your answer or show your working and write down your answer.
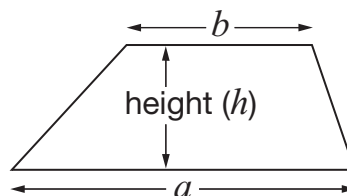
Calculators

You **may** use a calculator to answer any question in this test.

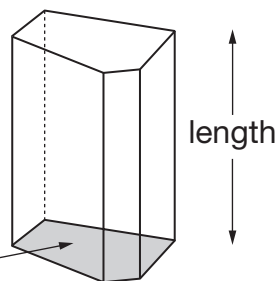## Formulae

You might need to use these formulae

Trapezium

Area $= \frac{1}{2}(a + b)h$

Prism

area of cross-section

length

Volume = area of cross-section × length

1. The shaded rectangle is **twice as long** as it is wide.

The **perimeter** of the rectangle is **30 cm**.

Not drawn
accurately

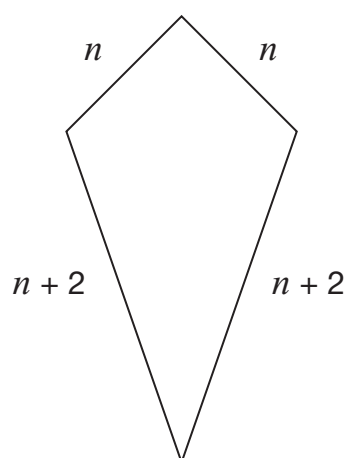What is the **area** of the rectangle?

_____ cm^2

2 marks

2. The diagram shows a kite.

The side lengths are in centimetres.

n n

$n + 2$ $n + 2$

Not drawn accurately

(a) When $n = 9$, what is the perimeter of the kite?

_____ cm

1 mark

(b) When the perimeter of the kite is **100 cm**, what is the value of n?

$n =$ _____

2 marks

3. I have a fair six-sided dice, numbered **4**, **9**, **12**, **16**, **20** and **24**

I am going to roll the dice.

(a) What is the probability of rolling a **multiple of 4**?

(b) What is the probability of rolling a **square number**?

4. The price of a coat is £65

In a sale the price is **reduced** by **15%**
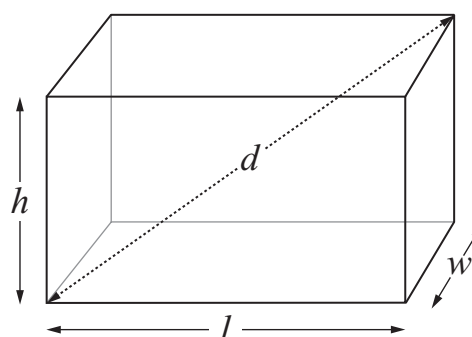
What is the sale price of the coat?

£ [   ]

2 marks

---

5. A cuboid has length, l, width, w, and height, h

The distance between opposite corners is d

Look at the formula.

$$d^2 = l^2 + w^2 + h^2$$

Use the formula to find the value of **d** when **$l = 6$**, **$w = 2$** and **$h = 3$**

$$d = \underline{\hspace{3cm}}$$

2 marks

6. (a) Is it possible to draw a triangle with **angles** 150°, 10° and 10°?

☐ Yes ☐ No

Explain your answer.

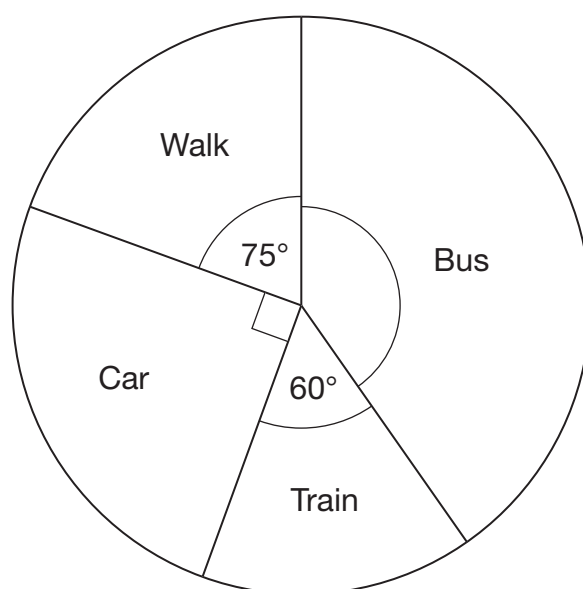(b) Is it possible to draw a triangle with **sides** 150 cm, 10 cm and 10 cm?

☐ Yes ☐ No

Explain your answer.

7. The pie chart shows how pupils in class 9A travelled to school one morning.

Walk

Bus

Not drawn
accurately

75°

Car

60°

Train

5 pupils in class 9A **walked** to school.

Work out how many pupils in class 9A travelled by **bus**.

_____ pupils

2 marks

8. (a) Every day a machine makes **500 000** drawing pins and puts them into boxes.

The machine needs **150** drawing pins to fill a box.

How many boxes can be filled with the 500 000 drawing pins?

_____ boxes

1 mark

(b) Each drawing pin is made from **0.23g** of metal.

How many drawing pins can be made from **1kg** of metal?

_____ drawing pins

2 marks

132009_p2.68.indd   9   07/12/2009   12:47:35

9. Here are some exchange rates.

£1	=	2.03 American dollars
£1	=	2.15 Canadian dollars

Use the exchange rates to answer these questions.

(a) How many **more Canadian** dollars than American dollars would you get for £250?

dollars

2 marks

(b) How many **more pounds (£)** would you get for 250 American dollars than for 250 Canadian dollars?

£

2 marks

132009_p2.68.indd   10   07/12/2009   12:47:35

10. The first square number is 1, and the sum of the **first 20** square numbers is **2870**

Work out the sum of the **first 21** square numbers.

2 marks

11. There are five people in the Smith family.

Females	Males
Mrs Smith, 38 years old	Mr Smith, x years old
Tina Smith, 9 years old	Ben Smith, y years old
Helen Smith, 7 years old	

The **mean** age of the **males** is **28**

What is the **mean** age of all **five** people in the family?

2 marks

12. The scatter graph shows the lengths and diameters of 15 acorns.
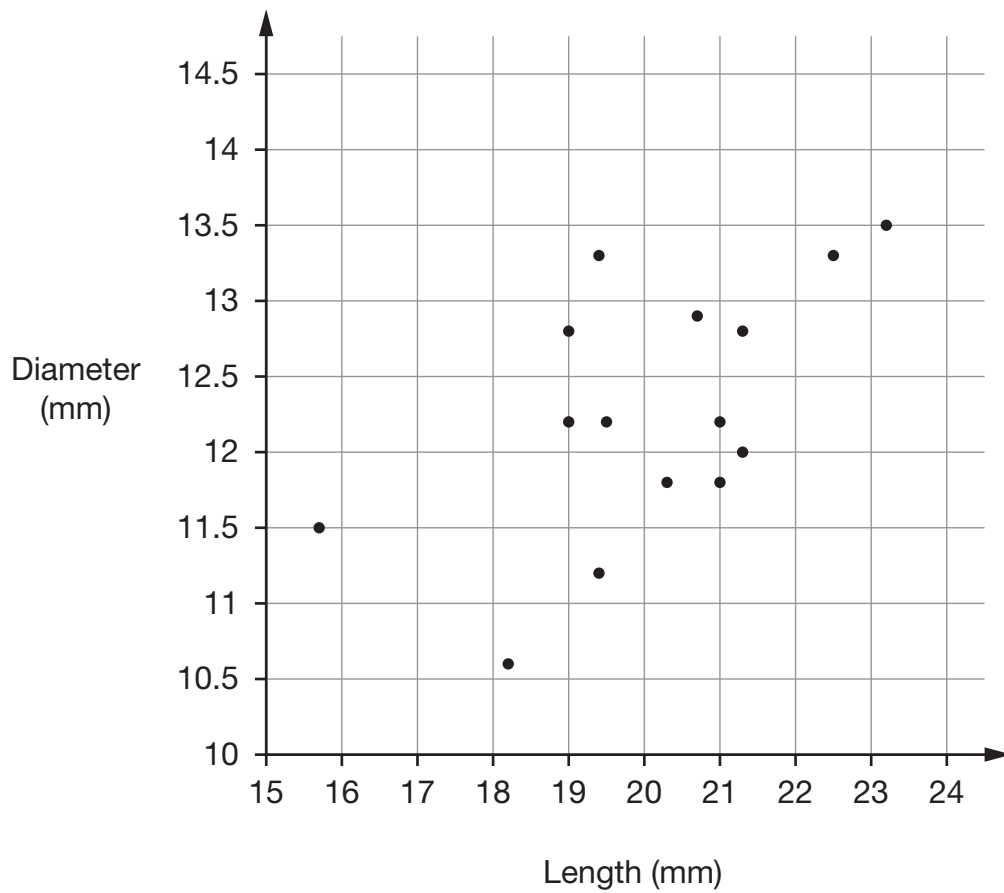
(a) What is the **modal class** of the **lengths** of the acorns?

Tick (✓) your answer.

| | 18 mm ≤ length < 19 mm | | 19 mm ≤ length < 20 mm |
| | 20 mm ≤ length < 21 mm | | 21 mm ≤ length < 22 mm |

1 mark

(b) Which point on the graph shows the **median length** of the acorns?
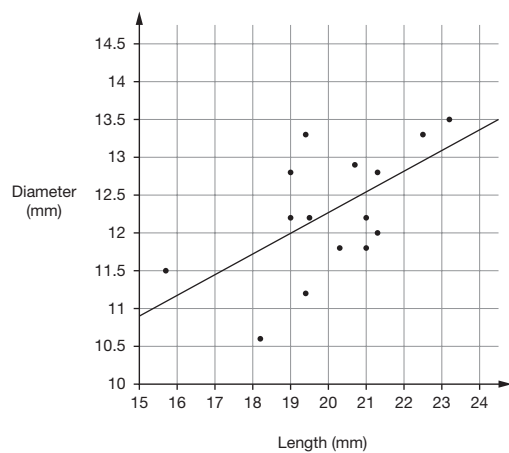
Put a ring round it.

1 mark

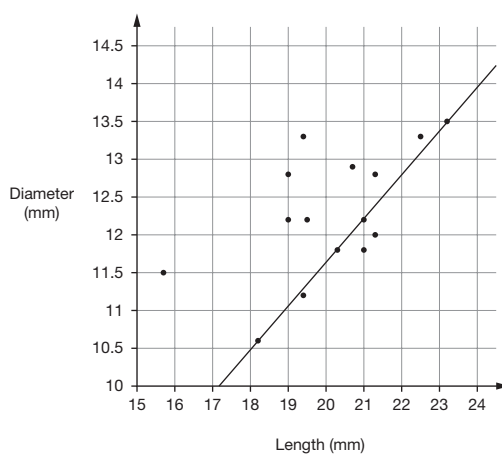(c)   Which scatter graph shows the **line of best fit**?
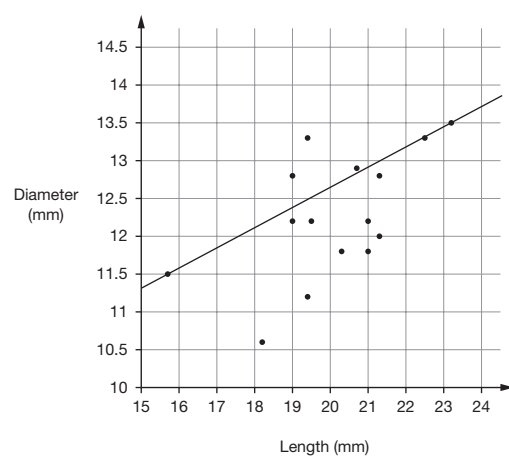
Tick (✓) the correct diagram.

☐ Diagram **A**

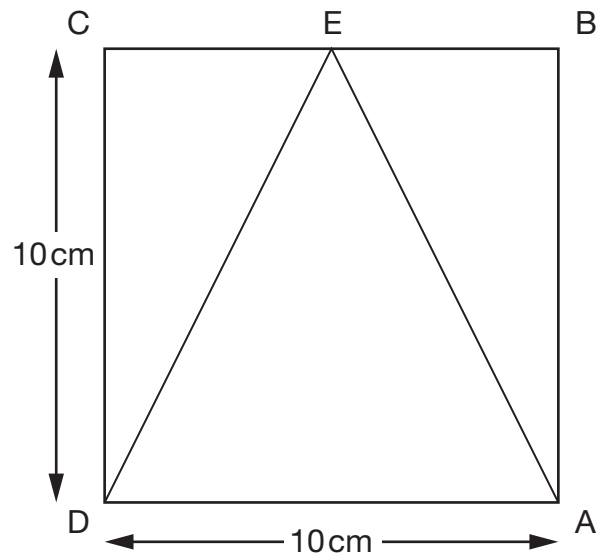☐ Diagram **B**

☐ Diagram **C**

1 mark

13. The **square** ABCD has side length 10cm.

E is the midpoint of BC.

Not drawn accurately

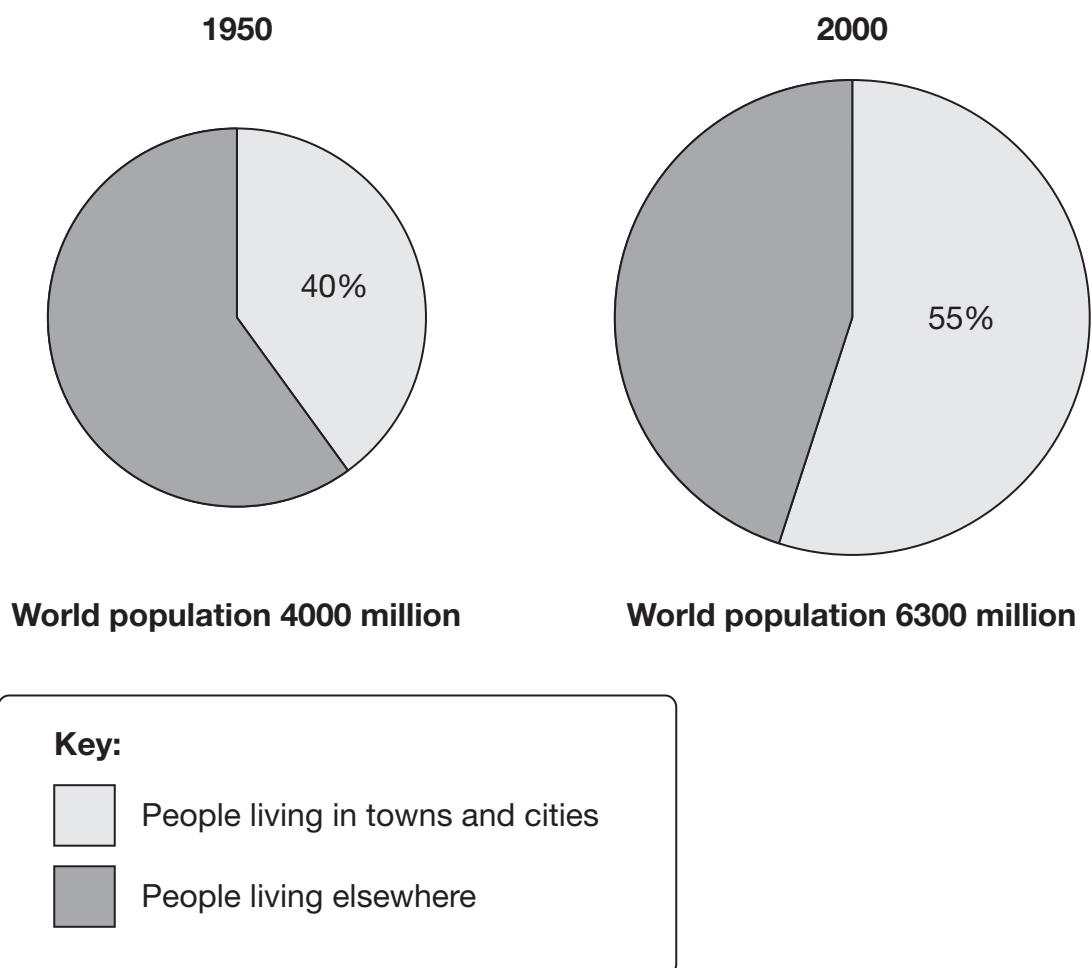Work out the length of DE.

Give your answer correct to **one decimal place**.

_____ cm

3 marks

14. Look at the pie charts showing information about the world population in the years 1950 and 2000.

1950

40%

World population 4000 million

2000

55%

World population 6300 million

Key:

People living in towns and cities

People living elsewhere

In the year 2000, **more** people lived in towns and cities than in 1950.

How many more?

_____ million

2 marks

15. This question is about number sequences and what their nth terms could be.

Write the missing information in each table.

First four terms of the sequence				nth term
3	6	9	12	$3n$
4	7	10	13	_____
_____ _____ _____ _____				$3(n + 1)$

1 mark

1 mark

First four terms of the sequence				nth term
1	4	9	16	n^2
0	3	8	15	_____
9	16	25	36	$(n + \underline{\hspace{1cm}})^2$

1 mark

1 mark

16. (a)   Show that, at **40km/h**, it takes 1 minute 30 seconds to travel 1km.

1 mark

(b)   At **80km/h**, how many seconds does it take to travel 1km?

_____ seconds

1 mark

17.   I am thinking of two numbers.

When I **add** my numbers, the answer is **1**

When I **multiply** my numbers, the answer is **0.09**
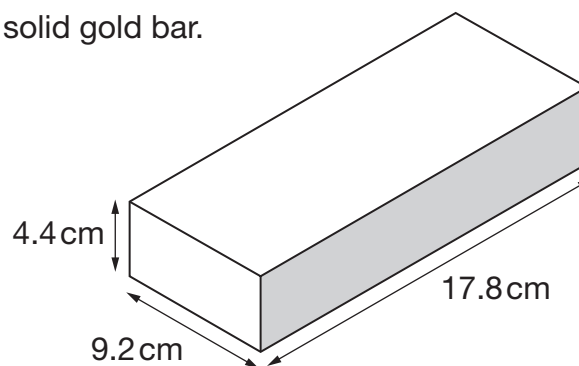
What are my numbers?

_____ and _____

1 mark

18. Here are the dimensions of a solid gold bar.

4.4 cm

17.8 cm

9.2 cm

Use the information below to calculate how much this gold bar is worth in British pounds (£).

- The gold bar is a cuboid.

- The density of gold is 19.3 grams per cm^3

- 1 ounce is 28.35 grams.

- The price of gold is 670 US dollars per ounce.
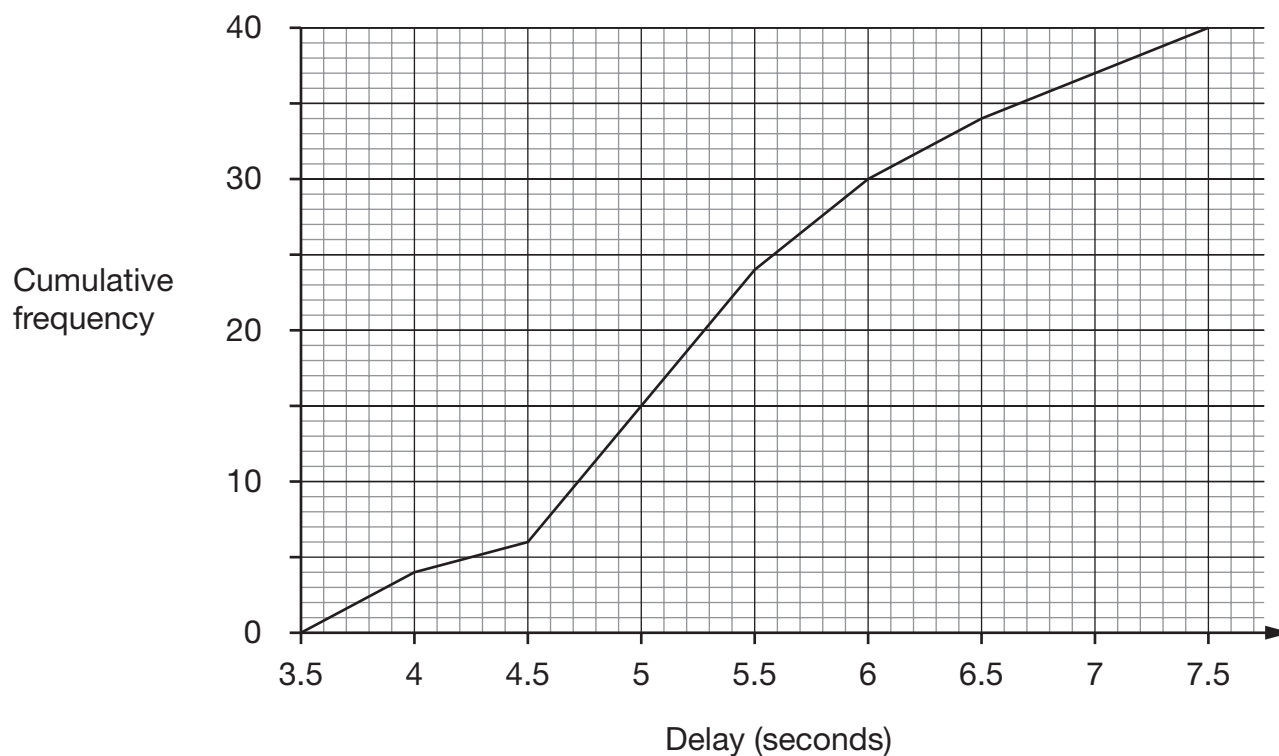
- 1 US dollar is 0.508 British pounds.

£

3 marks

19. After a camera flash is used there is a short delay before the camera can be used again.

The cumulative frequency diagram shows the delay for one camera in 40 trials.

(a) What is the median delay time?

_____ seconds

(b) About how many times could the camera flash be used in **one minute**?

Show working to explain your answer.

_____

20. (a)   The planet Jupiter is approximately **780 million km** from the Sun.

Write this number in standard form.

_____ km

(b)   The speed of light is about **3.0 × 10^5 km/sec**.

To the nearest minute, how many minutes does light take to travel from the Sun to Jupiter?

_____ minutes

21.   Here is some information about household rubbish in 2006.

> About **6.8 million** tonnes of household rubbish is recycled.
>
> This is **27%** of total household rubbish.
>
> About **20.1 million** tonnes of household rubbish could be recycled.

What percentage of household rubbish could be recycled?

_____ %

2 marks

132009_p2.68.indd   21   07/12/2009   12:47:38

22. Look at these simultaneous equations.

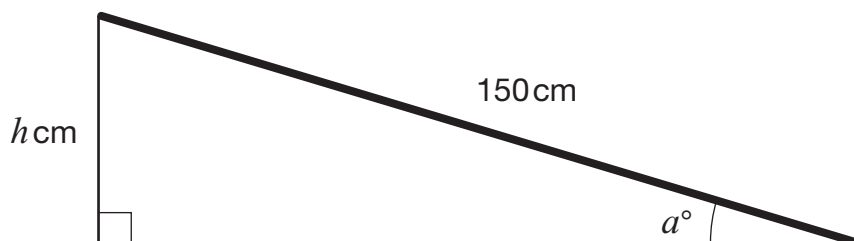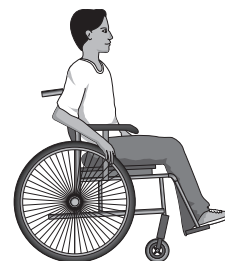$$a + b + c = 10$$
$$a + b - c = 3$$

Find the value of $a + b + 3c$

$$a + b + 3c = \underline{\hspace{3cm}}$$

2 marks

23. Mr Patel uses a ramp to move up and down steps.

The length of the ramp is 150 cm.

h cm

150 cm

$a°$

(a) Use trigonometry to show that when the angle, a, of the ramp is **10°** the height of the ramp, h, is **26.0 cm**, to one decimal place.

1 mark

(b) Mr Patel says:

> If h doubles, a must also double.

Show that he is **wrong**.

2 marks

PLEASE TURN OVER

24.   Look at this inequality:

$$c^2 d \leq -10$$

Think about the values that d could take, and tick (✓) the correct box in each row of the table.

	The inequality **must** be true	The inequality **could** be true	The inequality **cannot** be true
When $d > 0$			
When $d = 0$			
When $d < 0$			

Now do the same for c

	The inequality **must** be true	The inequality **could** be true	The inequality **cannot** be true
When $c > 0$			
When $c = 0$			
When $c < 0$			

3 marks