Ma

KEY STAGE 3

TIER 5–7

# 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**

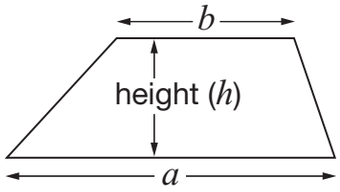
You **may** use a calculator to answer any question in this test.

# Formulae

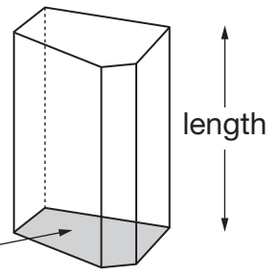
**You might need to use these formulae**

**Trapezium**

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

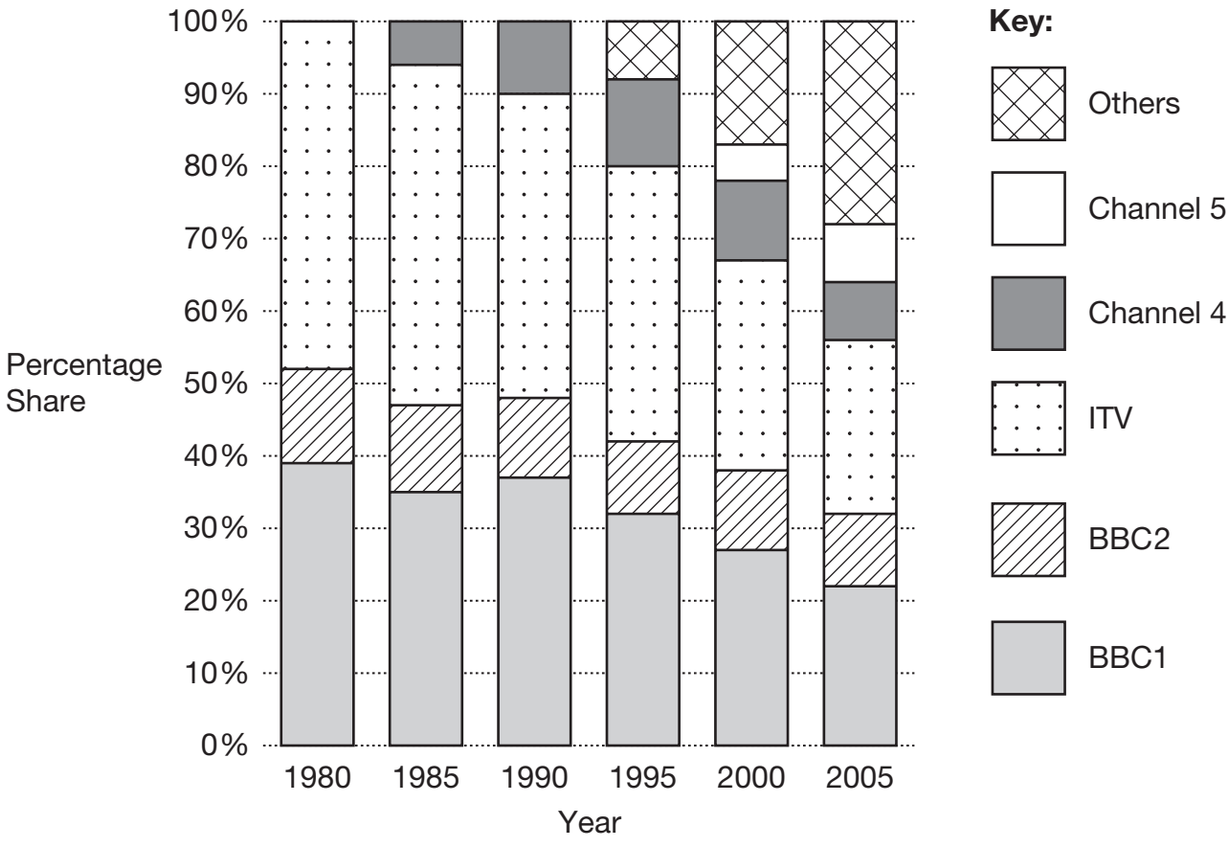



**Prism**




Volume = area of cross-section × length

**1.** The chart shows the popularity of different television channels.




Complete the missing information.

In **1980**, only three television channels were available. The most popular was _____ .

1 mark

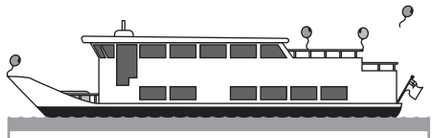
In **2005**, the biggest percentage share is for _____ .

1 mark

The percentage share for _____ remained **almost the same** at about _____ % each year.

1 mark

**2.** A boat can be hired for children's parties.



Have your child's party
on our boat

The formula below shows the cost.

Cost = £13.50 × the number of children + £23

(a) What is the cost of a party for **8 children**?

£

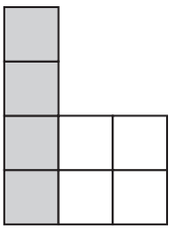
1 mark

(b) A different children's party cost **£225.50**

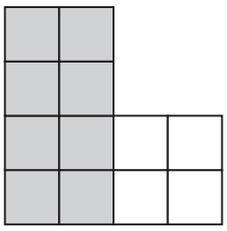
How many children were at the party?

2 marks

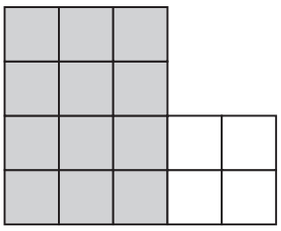
**3.** I make a sequence of shapes using grey and white tiles.



shape number 1



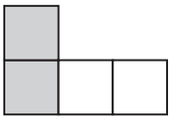
shape number 2



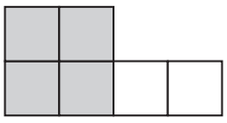
shape number 3

The total number of tiles in shape number $n$ is $\mathbf{4}\boldsymbol{n} + \mathbf{4}$

(a) I remove **half the tiles** to make the sequence of shapes below.



shape number 1



shape number 2

shape number 3

Complete the sentence.

The total number of tiles in shape number $n$ is _____

1 mark

(b) Then I remove **half the tiles** again.

shape number 1

shape number 2

shape number 3

Complete the sentence.

The total number of tiles in shape number $n$ is _____

1 mark

**4.** The table shows information about six types of bird that can be seen in Britain.

The birds are listed in order of size from biggest to smallest.

| Name of bird | Size of bird | When it can be seen | | Average egg length |
|---|---|---|---|---|
| | | Summer | Winter | |
| Mistle Thrush | ↑ Biggest | ✓ | ✓ | 31 mm |
| Fieldfare | | | ✓ | 29 mm |
| Blackbird | | ✓ | ✓ | 29 mm |
| Ring Ouzel | | ✓ | | 30 mm |
| Song Thrush | | ✓ | ✓ | 27 mm |
| Redwing | ↓ Smallest | | ✓ | 26 mm |

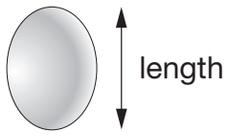
Use the table to answer these questions.

(a) What is the name of the **smallest** bird that can be seen in **summer**?

1 mark

(b) Fred says:

> In this table, the **bigger birds always have bigger egg lengths** than the smaller birds.




Is he correct?

☐ Yes ☐ No

Explain your answer.

1 mark

**5.** People pay to visit a garden.

| **Tickets:** | |
|---|---|
| Age 16 and over | £3.60 |
| Under 16 | £2.25 |

**145 people** pay.

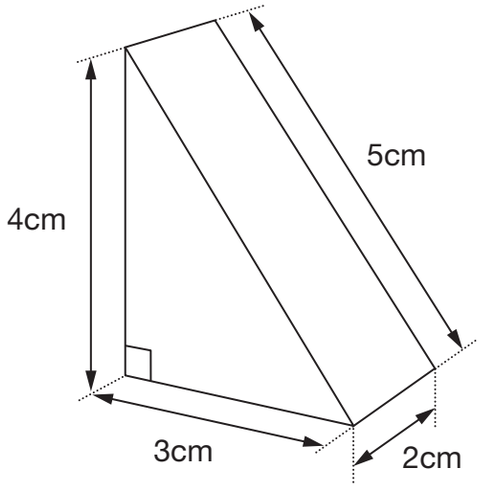
**39** of them are **under 16**

How much ticket money is paid altogether?

£

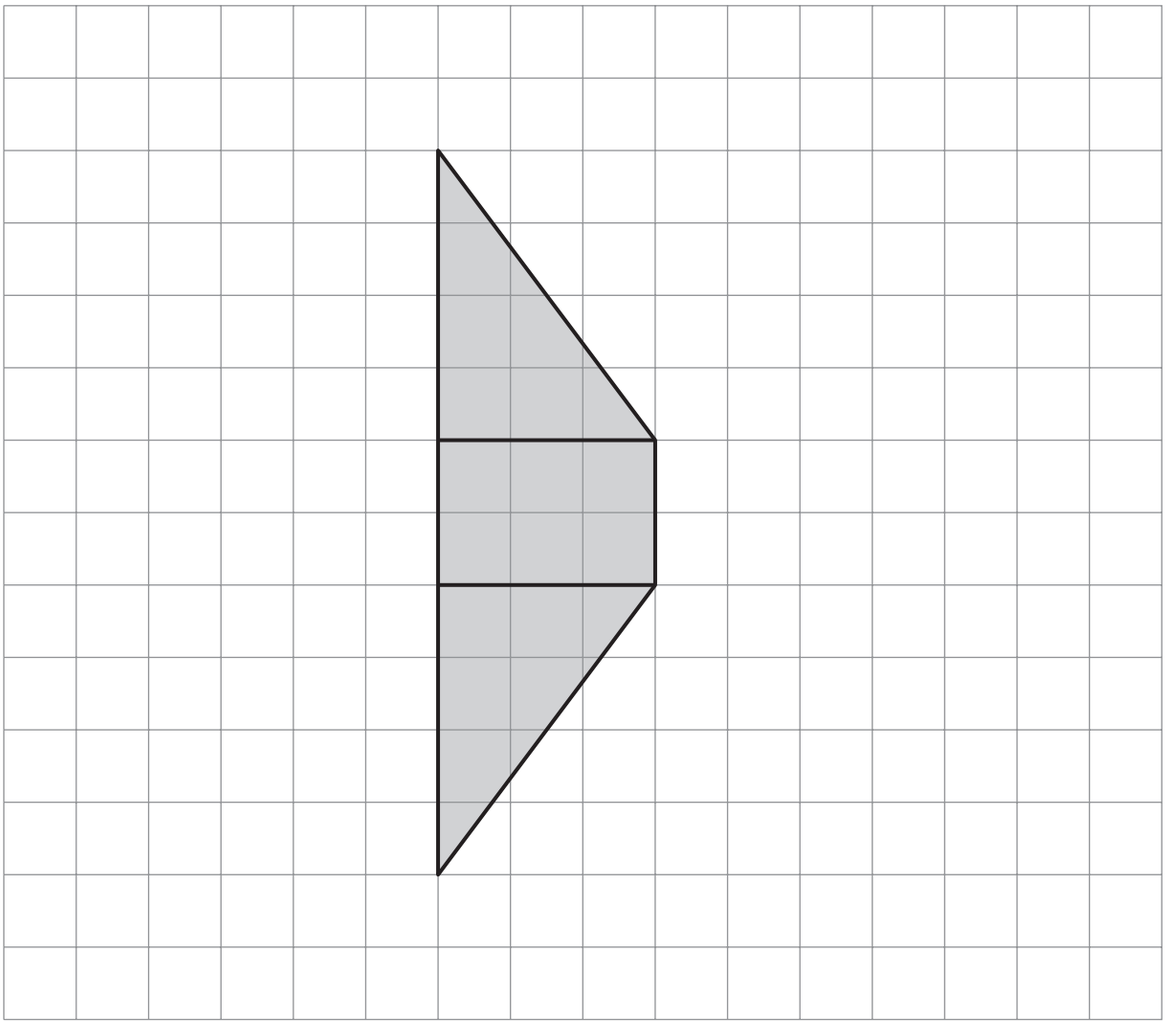
2 marks

**6.** The diagram shows a prism.




The centimetre square grid below shows part of the net for the prism.

Complete the **net accurately**.



1 mark

1 mark

**7.** (a) Dave says:

> 30 is the **only** multiple of 3 that ends in a zero.

Is he correct?

☐ Yes ☐ No

Explain your answer.

1 mark

(b) Ali says:

> 30 is the **only** number that is divisible by both 5 and 2

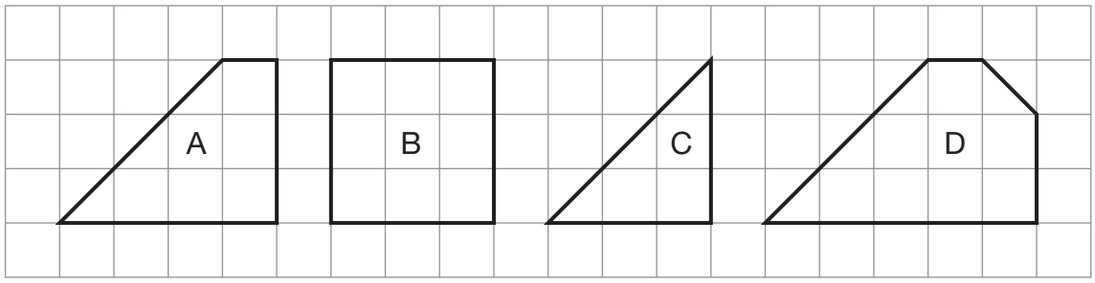
Is she correct?

☐ Yes ☐ No

Explain your answer.

1 mark

**8.** Each shape on this square grid has angles that are 45°, 90° or 135°




Complete the table.

| | A | B | C | D |
|---|---|---|---|---|
| Number of 45° angles | 1 | | | |
| Number of 90° angles | 2 | | | |
| Number of 135° angles | 1 | | | |

2 marks

**9.** (a) Write a number that is **bigger than** $5\frac{2}{3}$ but **smaller than 6**

1 mark

(b) Now write a number that is **bigger than 5.6** but **smaller than** $5\frac{2}{3}$

1 mark

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

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

Not drawn accurately

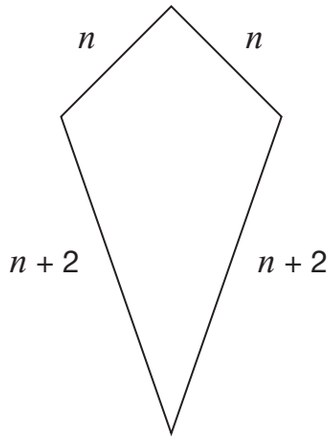
What is the **area** of the rectangle?

_____ $cm^2$

2 marks

**11.** The diagram shows a kite.

The side lengths are in centimetres.




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

**12.** 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**?

1 mark

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

1 mark

**13.** The price of a coat is £65

In a sale the price is **reduced** by **15%**

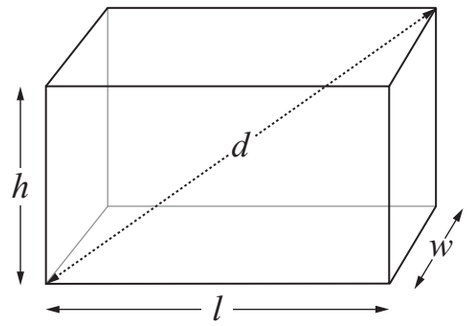
What is the sale price of the coat?

£ _____

2 marks

**14.** 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 $h = 3$

$d =$ _____

2 marks

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

☐ Yes ☐ No

Explain your answer.

1 mark

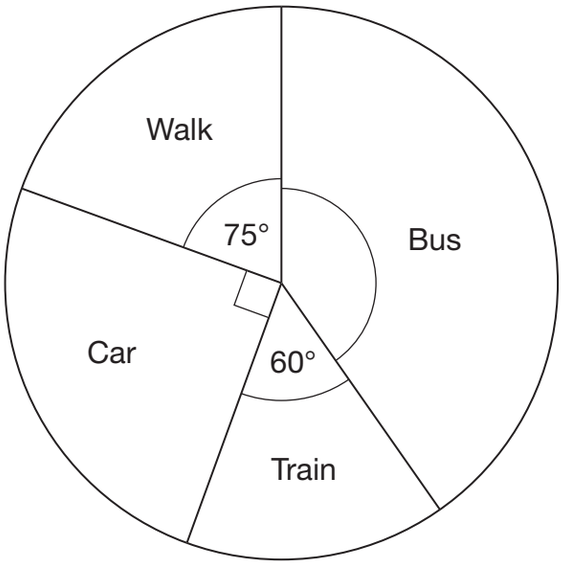
(b) Is it possible to draw a triangle with **sides** 150 cm, 10 cm and 10 cm?

☐ Yes ☐ No

Explain your answer.

1 mark

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




Not drawn accurately

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

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

_____ pupils

2 marks

**17.** (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

**18.** 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

**19.** 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

**20.** 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 | |

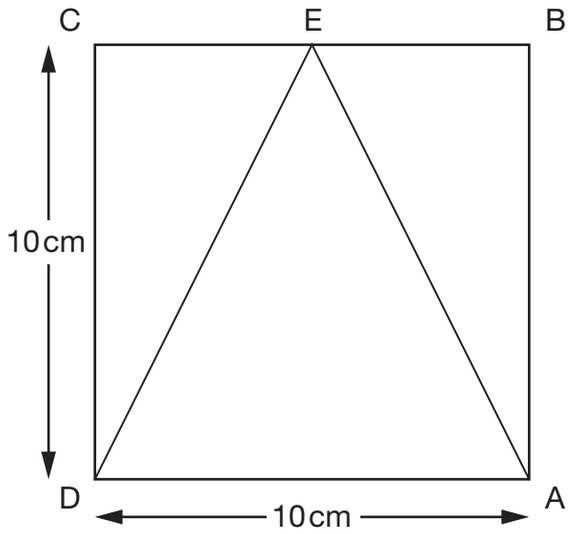
The **mean** age of the **males** is **28**

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

2 marks

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

E is the midpoint of BC.




Not drawn accurately

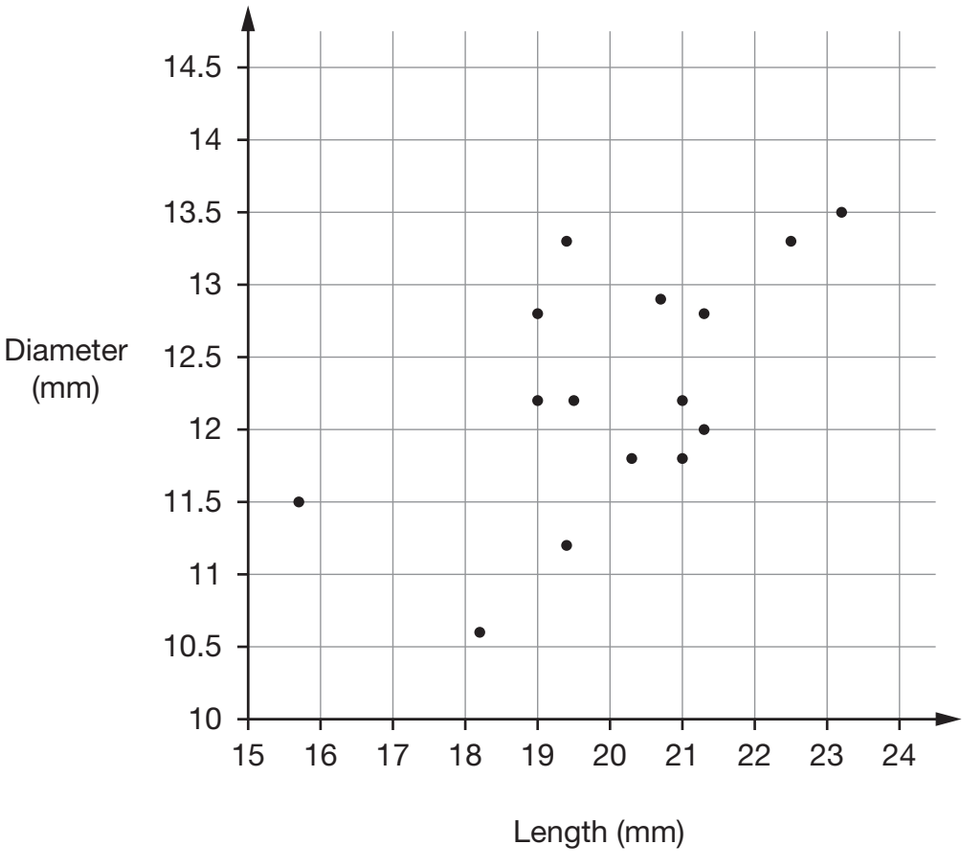
Work out the length of DE.

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

_____ cm

3 marks

**22.** 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?

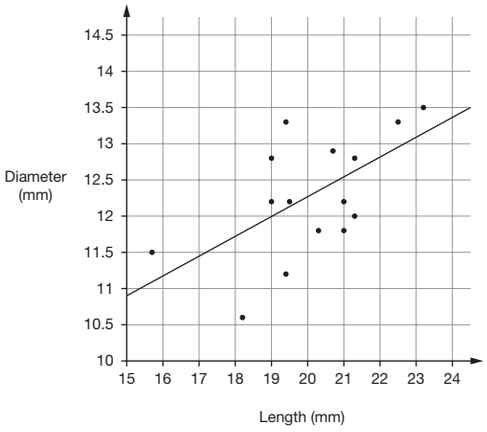
Put a ring round it.

1 mark

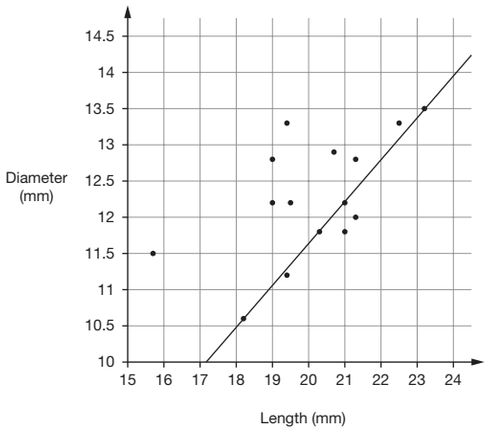
(c) Which scatter graph shows the **line of best fit**?

Tick (✓) the correct diagram.

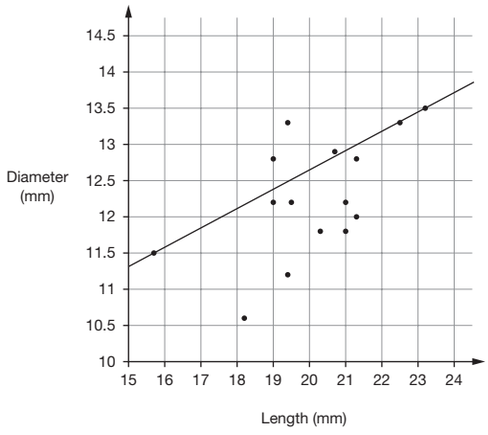
☐ Diagram **A**




☐ Diagram **B**



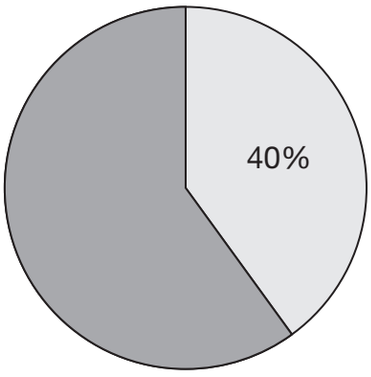

☐ Diagram **C**




1 mark

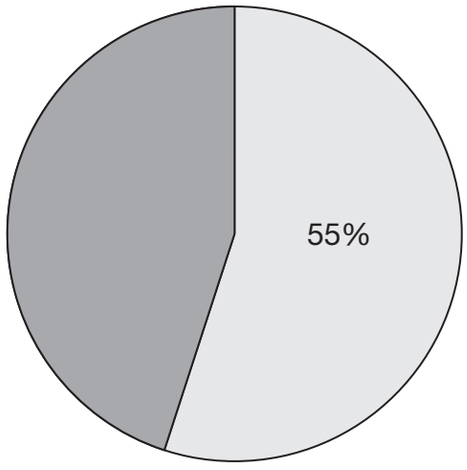
**23.** Look at the pie charts showing information about the world population in the years 1950 and 2000.

**1950**




**World population 4000 million**

**2000**




**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

**24.** This question is about number sequences and what their $n$th terms could be.

Write the missing information in each table.

| First four terms of the sequence | $n$th term |
|---|---|
| 3 6 9 12 | $3n$ |
| 4 7 10 13 | _____ |
| _____ _____ _____ _____ | $3\,(n + 1)$ |

1 mark

1 mark

| First four terms of the sequence | $n$th term |
|---|---|
| 1 4 9 16 | $n^2$ |
| 0 3 8 15 | _____ |
| 9 16 25 36 | $(n +$ _____ $)^2$ |

1 mark

1 mark

**25.** (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

**END OF TEST**

QCDA/10/4340 (Pupil pack)
QCDA/10/4333 (Teacher pack)
122009