

GCSE (9–1) Mathematics

J560/05 Paper 5 (Higher Tier)

Monday 6 November 2017 – Morning

Time allowed: 1 hour 30 minutes



You may use:

- Geometrical instruments
- Tracing paper

Do not use:

- A calculator



First name										
Last name										
Centre number						Candidate number				

INSTRUCTIONS

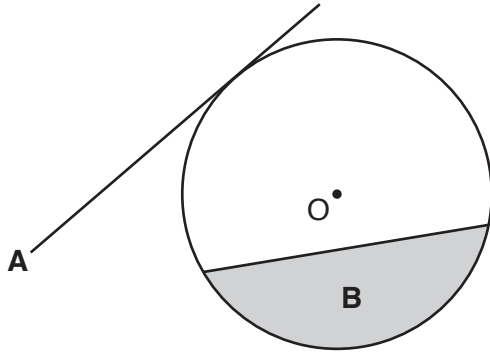
- Use black ink. You may use an HB pencil for graphs and diagrams.
- Complete the boxes above with your name, centre number and candidate number.
- Answer **all** the questions.
- Read each question carefully before you start to write your answer.
- Where appropriate, your answers should be supported with working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided.
- If additional space is required, you should use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.
- Do **not** write in the barcodes.

INFORMATION

- The total mark for this paper is **100**.
- The marks for each question are shown in brackets [].
- This document consists of **16** pages.

Answer **all** the questions.

1 The diagram shows a circle, centre O.



Write down the mathematical name of

(a) line A,

(a)[1]

(b) shaded region B.

(b)[1]

2 (a) Write the next term in each of these sequences.

(i) 1 1 2 3 5 8

(a)(i)[1]

(ii) 2 4 8 16 32 64

(ii)[1]

(b) Write an expression for the n th term of the sequence below.

15 12 9 6

(b)[2]

3 Andrew is thinking of a number.

- It is between 1 and 150.
- It is one more than a square number.
- It is three less than a cube number.
- It is not a prime number.

What is Andrew's number?

You must show all your reasoning.

..... [4]

4 (a) Factorise.

$$x^2 - 43^2$$

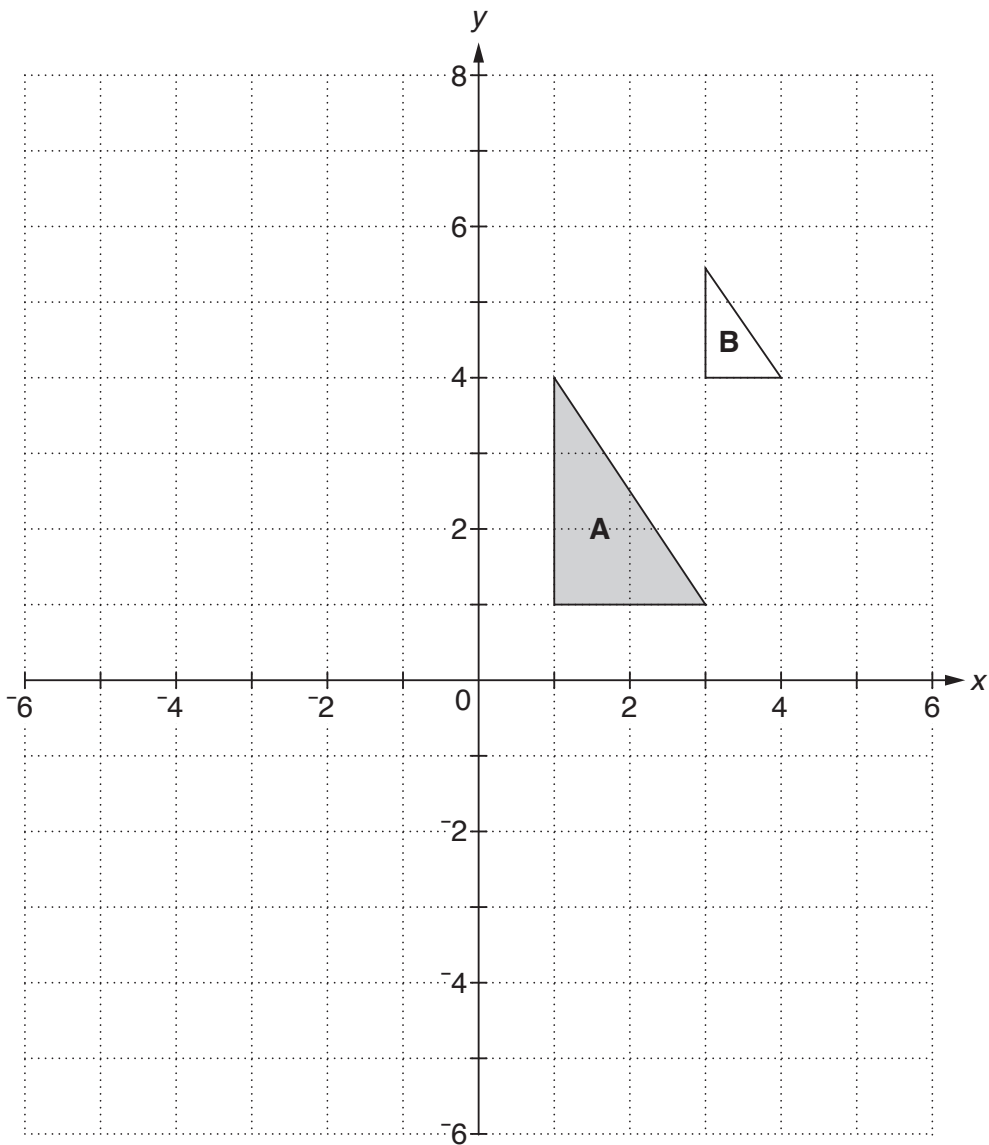
(a) [1]

(b) Calculate.

$$57^2 - 43^2$$

(b) [2]

5 Here is a coordinate grid.



(a) Draw the image of triangle **A** after a reflection in the line $y = -1$. [2]

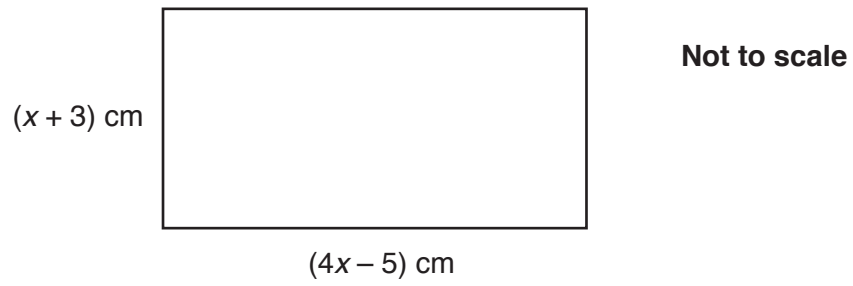
(b) Describe fully the **single** transformation that maps triangle **A** onto triangle **B**.

 [3]

(c) Complete this statement.
 A rotation of 180° around $(0, 0)$ has the same effect as an enlargement by
 scale factor with centre of enlargement (.....,). [2]

5

6 This rectangle has length $(4x - 5)$ cm and width $(x + 3)$ cm.



The perimeter of the rectangle is 46 cm.

Calculate the area of the rectangle.

..... cm² [5]

- 7 Naomi is given a 10% pay decrease.
Her new wage is £252 per week.

What would be her weekly wage if, instead, she had received a 10% pay increase?

£ [5]

- 8 The angles in a triangle are in the ratio 1 : 2 : 3.

(a) Show that the triangle is a right-angled triangle. [2]

- (b) The hypotenuse of the triangle is 15 cm long.

Calculate the length of the shortest side in the triangle.

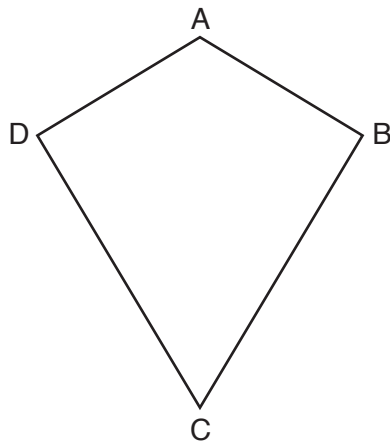
(b) cm [4]

- 9 There is a total of 250 men, women and children on a train.
The ratio of men to women is 4 : 5.
The ratio of women to children is 10 : 7.

How many men are on the train?

..... [4]

- 10 ABCD is a quadrilateral.
AD = AB and CD = CB.



Not to scale

Prove that angle ADC is equal to angle ABC.

.....
.....
.....
.....
.....
..... [4]

- 11 Amelia buys a new car.
The expected future value of this car, £ V , is given by

$$V = 16000 \times 0.75^t$$

where t is the age of the car in complete years.

- (a) (i) Write down the value of the car when new.

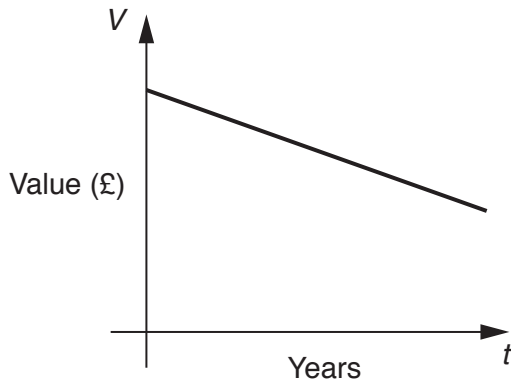
(i) £ [1]

- (ii) Write down the annual percentage decrease in the expected value of the car.

(ii) % [1]

- (iii) Show that the expected value of the car when 2 years old is £9000. [2]

- (b) Amelia sketches a graph to show the expected value of her car as it gets older.



Explain how you know that Amelia's graph is incorrect.

.....
 [1]

- (c) Amelia assumes that her car will have no value at all after 20 years.

Explain why her assumption is mathematically incorrect.

.....
..... [1]

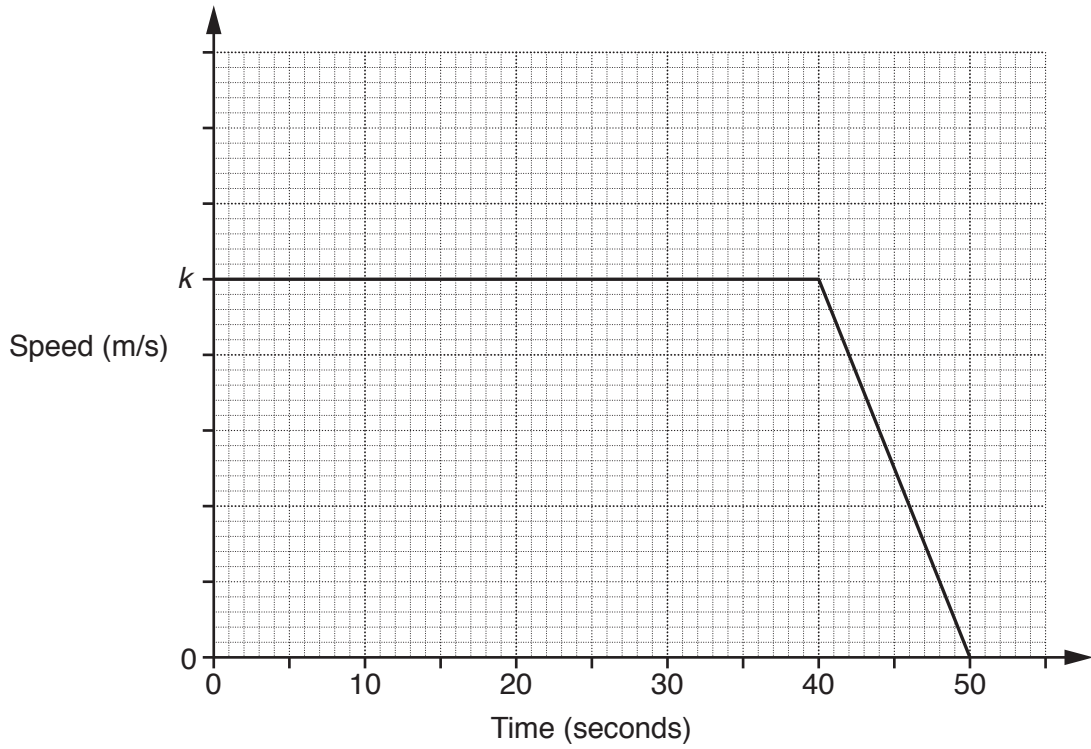
- 12 (a) Write $\frac{5}{6}$ as a recurring decimal.

(a) [2]

- (b) Convert $0.12\dot{6}$ to a fraction.
Give your answer in its lowest terms.

(b) [3]

- 13 The graph shows information about the speed of a vehicle during the final 50 seconds of a journey. At the start of the 50 seconds the speed is k metres per second. The distance travelled during the 50 seconds is 1.35 kilometres.



- (a) Work out the average speed of the vehicle during the 50 seconds. Give your answer in metres per second.

(a) m/s [2]

- (b) Work out the value of k .

(b) $k =$ [5]

(c) (i) Calculate the gradient of the graph in the final 10 seconds of the journey.

(c)(i) [1]

(ii) Describe what this gradient represents.

.....
..... [2]

14 Adam has 10 sweets in a bag.
5 are cherry sweets, 4 are lemon sweets and 1 is an orange sweet.

Adam chooses a sweet at random from the bag and eats it.
He then takes another sweet at random from the bag and eats it.

(a) Adam says

The probability that I choose two cherry sweets is $\frac{25}{100}$.

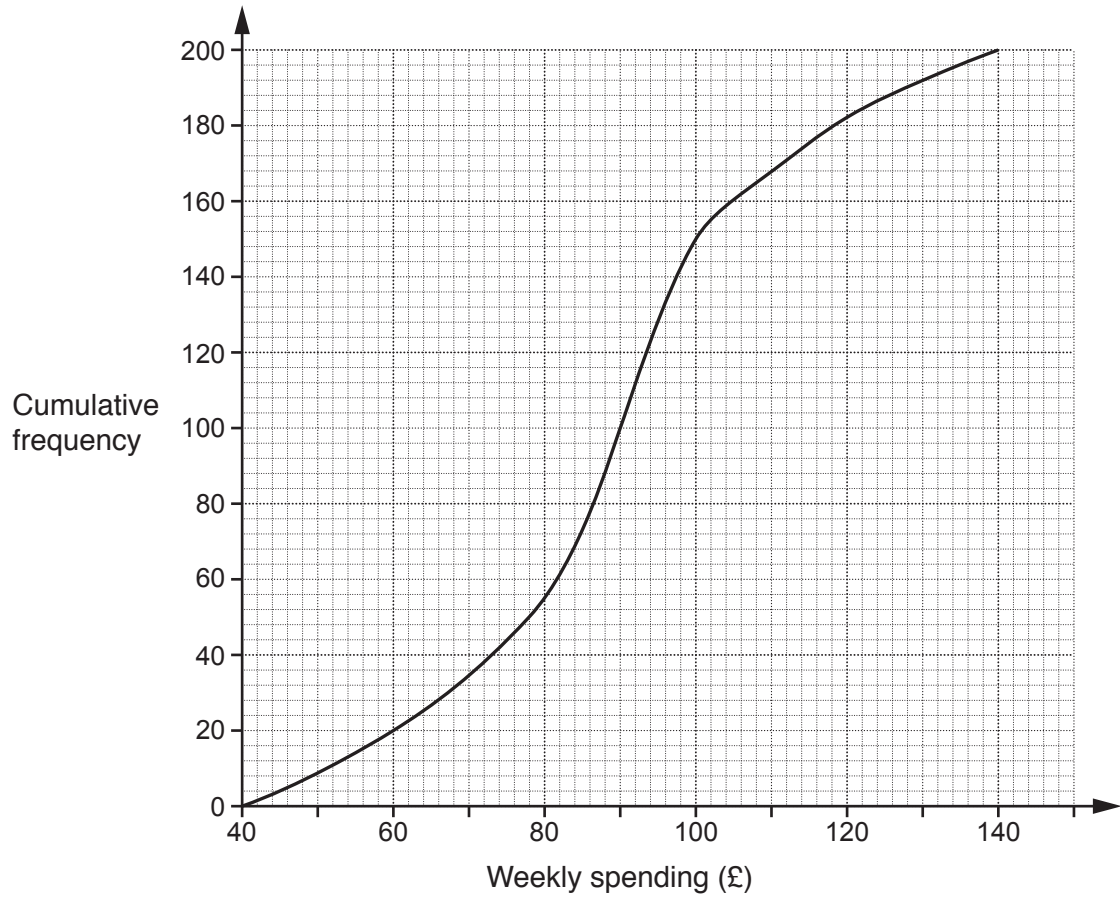
He is incorrect. Explain his error.

.....
..... [2]

(b) Find the probability that the two sweets he chooses have different flavours.

(b) [4]

- 15 Iqrah carries out a survey of 200 families in the **north** of England on their weekly spending on food.
The cumulative frequency diagram summarises the results.



(a) Find

(i) the median,

(a)(i) £ [1]

(ii) the interquartile range.

(ii) £ [2]

(b) Iqrah says

15% of these families spent over £120.

Is her statement correct?

State the evidence you have used in making your decision.

.....
 [2]

(c) In a survey of 200 families in the **south** of England, the median weekly amount spent on food was £84 and the interquartile range was £28.

Make two comparisons between the weekly amounts spent on food in the north of England and the south of England.

State the evidence you have used in making your comparisons.

1
 [2]

2
 [2]

16 (a) Write $\sqrt{12} + \sqrt{75}$ in the form $k\sqrt{3}$.

(a) [3]

(b) Work out.

$$16^{-\frac{3}{4}}$$

(b) [3]

17 Solve the inequality.

$$x^2 - 5x - 6 \leq 0$$

..... [4]

18 Prove that the difference between two consecutive square numbers is always odd. [4]

19 Solve these simultaneous equations algebraically.

$$y = 2x^2 - 7x + 4$$

$$y = 4x - 1$$

$$x = \dots\dots\dots y = \dots\dots\dots$$

$$x = \dots\dots\dots y = \dots\dots\dots \mathbf{[6]}$$

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).

A large rectangular area with a vertical line on the left side and horizontal dotted lines across the rest of the page, intended for writing answers.



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