cookie

Practice paper

GCSE Maths Higher, practice paper 5 (non-calculator) (OCR style)

In the style of OCR GCSE (9–1) Mathematics (J560) Paper 5 (Higher Tier)

Practice paper written by cookie in the style of OCR GCSE (9–1) Mathematics (J560) Paper 5 (Higher Tier). Not an OCR paper; not affiliated with or endorsed by OCR.

Time allowed: 1 hour 30 minutes

Total marks: 100

You must not use a calculator.

Name _____

Instructions

- Answer all the questions.
- Write your answer to each question in the space provided.
- Do not use a calculator. You can use geometrical instruments and tracing paper.
- Where appropriate, support your answer with working. Marks may be given for a correct method, even if your answer is wrong.
- The total mark for this paper is 100.
- The marks for each question are shown in brackets [ ].
- There are no diagrams in this paper; shapes and graphs are described in words.

Information

- The marks for each question are shown in brackets at the end of each part.
- The maximum mark for this paper is 100.
- A formula list is on the last page.

Do it online, timed and marked:
cookie.education/past-papers/gcse/cookie/maths-ocr-style

Answer ALL questions. Write your answers in the spaces provided.

1 (a) Work out 6.3 ÷ 0.07

Answer .....

(1)

(b) Work out 1 3/5 − 5/6
Give your answer as a fraction in its simplest form.

Answer .....

(2)

(Total for Question 1 is 3 marks)

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2 A household is choosing between two electricity tariffs.
Tariff A: a standing charge of 45p per day, plus 24p for each unit used.
Tariff B: no standing charge, and 30p for each unit used.
Over 90 days the household uses 600 units.
Which tariff is cheaper for these 90 days, and by how much?
You must show your working.

Answer .....

(4)

(Total for Question 2 is 4 marks)

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3 6 identical machines take 15 hours to complete an order.

(a) How long would 9 of these machines take to complete the same order?

Answer .....

(2)

(b) Write down one assumption you made in part (a).

Answer .....

(1)

(Total for Question 3 is 3 marks)

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4 The bearing of a point B from a point A is 064°.

(a) Work out the bearing of A from B.

Answer .....

(1)

(b) A point C is such that
• the bearing of C from B is 155°
• BC = AB.
Work out the bearing of C from A.

Answer .....

(3)

(Total for Question 4 is 4 marks)

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5 A rectangular floor measures 3.15 m by 2.25 m.
It is to be covered exactly with identical square tiles, with no gaps and no tile cut.
The side length of each tile is a whole number of centimetres.
Work out the smallest number of tiles that can be used.

Answer .....

(3)

(Total for Question 5 is 3 marks)

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6 A bag contains only red, blue and green beads.
The ratio of the number of red beads to the number of blue beads is 3 : 5.
A bead is taken at random from the bag. The probability that it is green is 0.2.

(a) Work out the probability that the bead is blue.

Answer .....

(2)

(b) There are 12 red beads in the bag.
Work out the number of green beads in the bag.

Answer .....

(2)

(Total for Question 6 is 4 marks)

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7 In a geometric sequence, the second term is 12 and the fifth term is 96.
Work out the first term of the sequence.

Answer .....

(3)

(Total for Question 7 is 3 marks)

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8 A rectangle has length (x + 7) cm and width x cm.
The length is reduced by 2 cm and the width is increased by 3 cm to make a new rectangle.
The area of the new rectangle is 21 cm^2 more than the area of the original rectangle.
Work out the perimeter of the original rectangle.

Answer .....

(5)

(Total for Question 8 is 5 marks)

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9 Josh cycles 36 km at an average speed of 16 km/h.
He then cycles another 24 km, taking 1 hour 45 minutes.
Work out Josh's average speed for the whole journey.

Answer .....

(4)

(Total for Question 9 is 4 marks)

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10 (a) The mean of four numbers is 9.
One of the four numbers is doubled. The mean of the four numbers is now 11.
Work out the number before it was doubled.

Answer .....

(2)

(b) Write the recurring decimal 0.3888… (the 8 repeats for ever) as a fraction in its simplest form.
You must show your working.

Answer .....

(3)

(Total for Question 10 is 5 marks)

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11 (a) Factorise fully $12x^2y - 18xy^3$

Answer .....

(2)

(b) Expand and simplify $(2x - 3)^2 - (x + 4)(x - 4)$

Answer .....

(3)

(Total for Question 11 is 5 marks)

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12 Eight swimmers take part in a race.
Gold, silver and bronze medals are given for first, second and third place. No two swimmers finish level.

(a) In how many different ways can the three medals be given out?

Answer .....

(2)

(b) Two of the swimmers are Amir and Beth.
In how many of these ways do both Amir and Beth win a medal?

Answer .....

(2)

(Total for Question 12 is 4 marks)

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13 A ball is dropped from a height of 256 cm.
After each bounce, the ball rises to 3/4 of the height it fell from.

(a) Work out the height the ball rises to after its third bounce.

Answer .....

(3)

(b) After which bounce does the ball first rise to a height of less than 50 cm?
You must show your working.

Answer .....

(2)

(Total for Question 13 is 5 marks)

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14 A tram starts from rest.
It accelerates uniformly to a speed of 12 m/s in 8 seconds.
It then travels at 12 m/s for 20 seconds.
It then decelerates uniformly and stops 6 seconds later.

(a) Work out the acceleration of the tram in the first 8 seconds.

Answer .....

(1)

(b) Use the area under the velocity–time graph to work out the total distance the tram travels.

Answer .....

(3)

(Total for Question 14 is 4 marks)

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15 ξ = {whole numbers from 1 to 20}
A = {multiples of 4}
B = {factors of 24}

(a) List the members of A ∩ B.

Answer .....

(1)

(b) A number is chosen at random from ξ.
Find the probability that the number is in (A ∪ B)′.

Answer .....

(2)

(Total for Question 15 is 3 marks)

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16 The mass, m grams, of a plastic ball is directly proportional to the cube of its radius, r cm.
A ball with radius 2 cm has a mass of 40 g.

(a) Work out the mass of a ball with radius 3 cm.

Answer .....

(3)

(b) Another of these balls has a mass of 625 g.
Work out its radius.

Answer .....

(1)

(Total for Question 16 is 4 marks)

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17 (a) Write $2^5 \times 8^3 \div 4^4$ as a single power of 2.

Answer .....

(2)

(b) Work out the exact value of $(16/81)^{-3/4}$

Answer .....

(2)

(Total for Question 17 is 4 marks)

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18 A solid toy is made by joining a hemisphere to a cone.
The flat face of the hemisphere fits exactly on the base of the cone.
The hemisphere has radius 3 cm. The cone has base radius 3 cm and perpendicular height 4 cm.
Volume of a sphere = $4/3\ \pi r^3$
Surface area of a sphere = $4\pi r^2$
Volume of a cone = $1/3\ \pi r^2 h$, where h is the perpendicular height
Curved surface area of a cone = πrl, where l is the slant height

(a) Work out the volume of the toy.
Give your answer in terms of π.

Answer .....

(3)

(b) Work out the total surface area of the toy.
Give your answer in terms of π.

Answer .....

(3)

(Total for Question 18 is 6 marks)

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19 Triangle PQR has a right angle at Q.
PR = 10 cm and angle QPR = 60°.
Work out the exact area of triangle PQR.
Give your answer in its simplest form.

Answer .....

(4)

(Total for Question 19 is 4 marks)

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20 Solve $2x^2 - 6x - 1 = 0$
Give your answers in their simplest surd form.

Answer .....

(3)

(Total for Question 20 is 3 marks)

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21 ABCD is a square, with its vertices labelled in order.
P is a point on the side BC and Q is a point on the side CD such that BP = CQ.

(a) Prove that triangle ABP and triangle BCQ are congruent.

Answer .....

(3)

(b) Hence prove that AP is perpendicular to BQ.

Answer .....

(2)

(Total for Question 21 is 5 marks)

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22 The curve C has equation $y = x^2 - 4x + 5$
The line L has equation $y = 2x - 4$
Show that L meets C at exactly one point, and find the coordinates of that point.

Answer .....

(4)

(Total for Question 22 is 4 marks)

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23 Solve $2 \cos x + 1 = 0$ for $0° \leq x \leq 360°$.

Answer .....

(3)

(Total for Question 23 is 3 marks)

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24 n is a positive integer.
Prove that $(3n + 1)^2 - (n - 1)^2$ is always a multiple of 16.

Answer .....

(4)

(Total for Question 24 is 4 marks)

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25 A and B are points on a circle with centre O and radius 6 cm.
Angle AOB = 120°.
The minor segment is the region between the chord AB and the minor arc AB.
Work out the exact area of the minor segment.
Give your answer in the form $a\pi - b\sqrt{3}$, where a and b are integers.

Answer .....

(4)

(Total for Question 25 is 4 marks)

END OF QUESTIONS

Formula list

Area of a trapezium = 1/2 (a + b)h, where a and b are the lengths of the parallel sides and h is their perpendicular separation

Volume of a prism = area of cross-section × length

Where r is the radius and d is the diameter: circumference of a circle = $2\pi r = \pi d$; area of a circle = πr^2

Pythagoras' theorem: in a right-angled triangle where c is the hypotenuse, $a^2 + b^2 = c^2$

Trigonometry: in a right-angled triangle ABC with the right angle at C, so that c is the hypotenuse, sin A = a/c, cos A = b/c, tan A = a/b

In any triangle ABC: sine rule $a/\sin A = b/\sin B = c/\sin C$; cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$; area of triangle = 1/2 ab sin C

Compound interest: total accrued = $P(1 + r/100)^n$, where P is the principal amount, r is the interest rate over a given period and n is the number of times that the interest is compounded

Probability: P(A or B) = P(A) + P(B) − P(A and B); P(A and B) = P(A given B) × P(B)

The quadratic formula: the solutions of $ax^2 + bx + c = 0$, where $a \neq 0$, are $x = (-b \pm \sqrt{(b^2 - 4ac)}) / 2a$