

IGCSE Mathematics 0580 Paper 4 (Extended) Mock Paper (10 questions, 100 marks)

IGCSE (Year 10-11) Chemistry | 時限：150 分鐘 | 總分：100 分 | 共 10 題

All questions (100 marks) — Questions 1 to 10

Answer ALL questions. Write your answers in the spaces provided and show all working; give units where appropriate. Use $\pi = 3.142$ unless told otherwise.

1. (a) Write 0.000472 in standard form ($a \times 10^n$, $1 \leq a < 10$). [1] (b) Calculate $(3.6 \times 10^5) \times (2.5 \times 10^{-3})$, giving your answer in standard form. [2] (c) A car costs \$186,000. Its price is increased by 7.5% and then reduced by 4%. Find the final price. [2] (d) Express 45 minutes as a fraction of 2 hours in its simplest form. [1] (e) \$4,500 is invested at a simple interest rate of 3.2% per year for 2.5 years. Find the interest earned. [2]

答案：(a) 4.72×10^{-4} . [1] (b) $3.6 \times 2.5 = 9.0$ and $10^5 \times 10^{-3} = 10^2$, so $9.0 \times 10^2 (= 900)$. [2] (c) $186,000 \times 1.075 = \$199,950$; $199,950 \times 0.96 = \$191,952$. [2] (d) $45 / 120 = 3/8$. [1] (e) $4500 \times 3.2\% \times 2.5 = \360 . [2]

2. (a) Expand $(2x - 3)(x + 5)$. [2] (b) Factorise $6x^2 - 9x$. [2] (c) Solve $5(x - 3) = 2x + 6$. [2] (d) Given $V = (1/3)\pi r^2 h$, make r the subject. [2] (e) Solve $x^2 - 7x + 10 = 0$. [2]

答案：(a) $2x^2 + 10x - 3x - 15 = 2x^2 + 7x - 15$. [2] (b) $3x(2x - 3)$. [2] (c) $5x - 15 = 2x + 6$, so $3x = 21$ and $x = 7$. [2] (d) $r^2 = 3V / (\pi h)$, so $r = \sqrt{(3V / (\pi h))}$ taking the positive root. [2] (e) $(x - 2)(x - 5) = 0$, so $x = 2$ or $x = 5$. [2]

3. A biscuit recipe uses 250 g of flour, 100 g of sugar and 150 g of butter to make 24 biscuits. (a) Find the mass of flour, sugar and butter needed to make 60 biscuits. [4] (b) y is directly proportional to x^2 and $y = 48$ when $x = 4$. Find y when $x = 7$. [2] (c) 6 workers take 8 days to finish a job. How long would 4 workers take, working at the same rate? [2] (d) A map has a scale of 1 : 25,000 and a distance of 6.4 cm is measured on it. Find the real distance in km. [2]

答案：(a) Scale factor = $60 / 24 = 2.5$; flour $250 \times 2.5 = 625$ g; sugar $100 \times 2.5 = 250$ g; butter $150 \times 2.5 = 375$ g. [4] (b) $y = kx^2$, so $48 = 16k$ and $k = 3$; when $x = 7$, $y = 3 \times 49 = 147$. [2] (c) Total work = $6 \times 8 = 48$ worker-days, so 4 workers need $48 / 4 = 12$ days. [2] (d) $6.4 \times 25,000 = 160,000$ cm = 1,600 m = 1.6 km. [2]

4. (a) The exterior angle of a regular polygon is 24° . Find the number of sides and the size of each interior angle. [2] (b) The angles of a triangle are $(2x + 10)^\circ$, $(3x - 10)^\circ$ and x° . Find x and the three angles. [2] (c) The angle at the centre AOB and the angle at the circumference ACB stand on the same arc. Given $\angle ACB = 68^\circ$, find $\angle AOB$. [2] (d) In a cyclic quadrilateral ABCD, $\angle A = 115^\circ$. Find $\angle C$. [1] (e) The bearing of B from A is 118° . Find the bearing of A from B. [3]

答案：(a) Number of sides = $360 / 24 = 15$; each interior angle = $180 - 24 = 156^\circ$. [2] (b) $(2x + 10) + (3x - 10) + x = 180$, so $6x = 180$ and $x = 30$; the angles are 70° , 80° and 30° . [2] (c) Angle at centre = $2 \times$ angle at circumference = $2 \times 68 = 136^\circ$. [2] (d) Opposite angles of a cyclic quadrilateral add to 180° , so $\angle C = 180 - 115 = 65^\circ$. [1] (e) Back bearing = $118 + 180 = 298^\circ$. [3]

5. (a) In a right-angled triangle the hypotenuse is 13 cm and the opposite side is 5 cm. Find the acute angle θ to 1 decimal place. [2] (b) A ladder 7.5 m long makes an angle of 68° with the ground. Find the height of the top of the ladder, to 3 significant figures. [2] (c) A ship sails 12 km east and then 9 km north. Find its distance from the start and the bearing of the ship from the start. [3] (d) Two sides of a triangle are 8 cm and 11 cm and the included angle is 60° . Find the third side to 3 significant figures. [3]

答案 : (a) $\sin \theta = 5 / 13$, so $\theta = 22.6^\circ$. [2] (b) Height = $7.5 \times \sin 68^\circ = 6.95$ m. [2] (c) Distance = $\sqrt{(12^2 + 9^2)} = \sqrt{225} = 15$ km; bearing = $\tan^{-1}(12 / 9) = 53.1^\circ$, that is 053° . [3] (d) $a^2 = 64 + 121 - 2 \times 8 \times 11 \times \cos 60^\circ = 185 - 88 = 97$, so $a = 9.85$ cm. [3]

6. The daily reading times, in minutes, of ten students are: 12, 15, 11, 18, 15, 20, 14, 15, 17, 13. (a) Find the mean. [2] (b) Find the median. [1] (c) Find the mode and the range. [2] (d) Another class of 15 students has a mean of 18 minutes. Find the mean of all 25 students. [3] (e) Which average, mean or median, better describes a typical reading time here? Give a reason. [2]

答案 : (a) Total = 150, so mean = $150 / 10 = 15$ minutes. [2] (b) In order: 11, 12, 13, 14, 15, 15, 15, 17, 18, 20; median = $(15 + 15) / 2 = 15$ minutes. [1] (c) Mode = 15 minutes; range = $20 - 11 = 9$ minutes. [2] (d) Combined total = $150 + 15 \times 18 = 420$, so mean = $420 / 25 = 16.8$ minutes. [3] (e) Both are 15 minutes and there are no extreme values, so both work; the mode (15 minutes, occurring 3 times) also describes it, but the mean uses all the data. [2]

7. A bag contains 5 red, 3 blue and 2 green balls. One ball is taken at random. (a) Find the probability that it is red. [1] (b) Two balls are taken without replacement. Find the probability that both are red. [2] (c) Two balls are taken without replacement. Find the probability that at least one is red. [3] (d) A ball is taken, its colour noted, and it is replaced; then a second ball is taken. Find the probability of blue then green. [2] (e) The ball is drawn 200 times with replacement. How many red balls are expected? [2]

答案 : (a) $5 / 10 = 1/2$. [1] (b) $5/10 \times 4/9 = 20/90 = 2/9$. [2] (c) $P(\text{no red}) = 5/10 \times 4/9 = 2/9$, so $P(\text{at least one red}) = 1 - 2/9 = 7/9$. [3] (d) $3/10 \times 2/10 = 6/100 = 0.06$. [2] (e) $200 \times 1/2 = 100$ times. [2]

8. (a) Find the n -th term of the sequence 7, 12, 17, 22, ... [2] (b) Find the 10th term of this sequence. [1] (c) Is 103 a term of the sequence? Explain. [2] (d) The sequence 2, 7, 14, 23, 34, ... has a constant second difference. Find its n -th term. [3] (e) Find the sum of the first 20 terms of 7, 12, 17, ... [2]

答案 : (a) Common difference 5 and first term 7, so the n -th term is $5n + 2$. [2] (b) 10th term = $5 \times 10 + 2 = 52$. [1] (c) $5n + 2 = 103$ gives $n = 20.2$, which is not an integer, so 103 is not a term. [2] (d) First differences 5, 7, 9, 11; the second difference is 2, so the n -th term is $n^2 + bn + c$. From $n = 1$: $1 + b + c = 2$ and $n = 2$: $4 + 2b + c = 7$, giving $b = 2$ and $c = -1$, so the n -th term is $n^2 + 2n - 1$ (check: 5th term = 34). [3] (e) Sum = $20/2 \times (2 \times 7 + 19 \times 5) = 10 \times 109 = 1,090$. [2]

9. Given that $f(x) = x^2 - 4x + 3$. (a) Write $f(x)$ in the form $(x - h)^2 + k$ and state the minimum point of the graph. [3] (b) Solve $f(x) = 0$. [2] (c) Find $f(-2)$. [1] (d) Solve $f(x) = 8$. [3] (e) State the line of symmetry and the y -intercept of the graph. [2]

答案 : (a) $x^2 - 4x + 3 = (x - 2)^2 - 4 + 3 = (x - 2)^2 - 1$; the minimum point is (2, -1). [3] (b) $(x - 1)(x - 3) = 0$, so $x = 1$ or $x = 3$. [2] (c) $f(-2) = 4 + 8 + 3 = 15$. [1] (d) $x^2 - 4x + 3 = 8$, so $x^2 - 4x - 5 = 0$ and $(x - 5)(x + 1) = 0$, giving $x = 5$ or $x = -1$. [3] (e) Line of symmetry $x = 2$; y -intercept 3, that is the point (0, 3). [2]

10. Take $\pi = 3.142$. (a) A cylinder has radius 7 cm and height 10 cm. Find its volume in cm^3 to 3 significant figures. [2] (b) A cone has radius 7 cm and height 24 cm. Find its slant height, its volume and its curved surface area. [5] (c) A sphere has radius 6 cm. Find its surface area and volume to 3 significant figures. [2] (d) A solid hemisphere has radius 6 cm. Find its total surface area. [2]

答案：(a) $V = \pi \times 7^2 \times 10 = 1539.58 \approx 1,540 \text{ cm}^3$. [2] (b) Slant height $l = \sqrt{7^2 + 24^2} = \sqrt{625} = 25 \text{ cm}$; $V = (1/3) \times \pi \times 7^2 \times 24 = 1231.66 \approx 1,230 \text{ cm}^3$; curved area $= \pi \times 7 \times 25 = 549.85 \approx 550 \text{ cm}^2$. [5] (c) Surface area $= 4 \times \pi \times 6^2 = 452.45 \approx 452 \text{ cm}^2$; volume $= (4/3) \times \pi \times 6^3 = 904.90 \approx 905 \text{ cm}^3$. [2] (d) Total surface area $= 3 \times \pi \times 6^2 = 339.34 \approx 339 \text{ cm}^2$ (curved surface plus the flat circle). [2]