

GCSE / IGCSE Maths – Number

GCSE / IGCSE (Higher tier, Edexcel/Cambridge style) · Total marks: 63 · Answers on the last page

Covers fractions, percentages (including reverse and compound), standard form, surds, HCF/LCM, recurring decimals and upper/lower bounds. Section A is non-calculator; Sections B and C allow a calculator. Allow about 60 minutes.

Section A – Skills (Non-calculator.)

1. Work out, giving each answer as a fraction in its simplest form:

(a) $\frac{2}{3} + \frac{3}{4}$

(b) $\frac{2}{3} \times \frac{3}{10}$

(c) $3\frac{1}{2} \div \frac{7}{8}$

(d) $\frac{2}{5} + \frac{3}{8} \times \frac{4}{9}$

[7]

2. (a) Write 84 and 126 as products of their prime factors.

(b) Hence find the highest common factor (HCF) and lowest common multiple (LCM) of 84 and 126.

[4]

3. (a) Write $0.\dot{4}\dot{5}$ as a fraction in its simplest form.

(b) Show that $0.2\dot{7} = \frac{5}{18}$.

[5]

4. Simplify fully:

(a) $\sqrt{50} + \sqrt{18}$

(b) $(3 + \sqrt{5})(2 - \sqrt{5})$

(c) $\frac{6}{\sqrt{3}}$

(d) $\frac{4}{3 - \sqrt{5}}$

[8]

5. Work out, giving your answers in standard form:

(a) $(3.2 \times 10^5) \times (4 \times 10^{-3})$

(b) $(8.4 \times 10^7) \div (2.1 \times 10^{-2})$

(c) $7.5 \times 10^{-4} + 2.4 \times 10^{-5}$

[6]

Section B – Exam style (Calculator allowed.)

6. (a) Decrease 340 by 15 percent.

(b) A jacket costs 65 pounds before VAT. VAT is charged at 24 percent. Find the price including VAT.

(c) In a sale, all prices are reduced by 20 percent. A coat costs 96 pounds in the sale. Find its original price.

[6]

7. (a) Amira invests 4500 pounds at 3 percent per year compound interest. Find the value of the investment after 3 years, to the nearest penny.

(b) A car bought for 12 000 pounds loses 15 percent of its value each year. Find its value after 4 years, to the nearest pound.

[5]

8. A length is measured as 4.7 cm, correct to 1 decimal place.
(a) Write down the error interval for the length l .
(b) A mass m is given as 12.30 kg correct to 2 decimal places. Write down the upper bound of m .
[3]
9. A rectangle has length 8.4 cm and width 3.6 cm, each measured correct to 1 decimal place. Calculate the upper and lower bounds of the area of the rectangle. [4]

Section C – Problem solving (Calculator allowed.)

10. A sprinter runs 120 m, measured to the nearest metre, in 15.4 s, measured to the nearest 0.1 s.
(a) Calculate the upper bound and the lower bound of the sprinter's average speed.
(b) By considering your answers to (a), write down the average speed to a suitable degree of accuracy, and explain your reasoning. [6]
11. The population of a town is 2.4×10^4 . Each year it increases by 8 percent.
(a) Show that after n years the population is $2.4 \times 10^4 \times 1.08^n$.
(b) After how many complete years will the population first exceed 4×10^4 ? [5]
12. Show that $\frac{(\sqrt{8} + 2)^2}{\sqrt{2}}$ can be written in the form $a\sqrt{2} + b$ where a and b are integers. [4]

Answers

Check your working against these. If an answer does not match, try the question again before looking for the method.

1. (a) $\frac{17}{12} = 1\frac{5}{12}$
 (b) $\frac{3}{5}$
 (c) 4
 (d) $\frac{2}{5} + \frac{1}{6} = \frac{17}{30}$
2. (a) $84 = 2^2 \times 3 \times 7$, $126 = 2 \times 3^2 \times 7$
 (b) HCF = 42, LCM = 252
3. (a) $\frac{45}{99} = \frac{5}{11}$
 (b) $x = 0.\dot{2}7$, $10x = 2.\dot{7}$, $100x = 27.\dot{7}$, $90x = 25 \Rightarrow x = \frac{25}{90} = \frac{5}{18}$
4. (a) $8\sqrt{2}$
 (b) $1 - \sqrt{5}$
 (c) $2\sqrt{3}$
 (d) $\frac{4(3 + \sqrt{5})}{4} = 3 + \sqrt{5}$
5. (a) 1.28×10^3
 (b) 4×10^9
 (c) 7.74×10^{-4}
6. (a) 289
 (b) 80.60 pounds
 (c) $96 \div 0.8 = 120$ pounds
7. (a) $4500 \times 1.03^3 = 4917.27$ pounds
 (b) $12000 \times 0.85^4 = 6264$ pounds
8. (a) $4.65 \leq l < 4.75$
 (b) 12.305 kg
9. Upper bound = $8.45 \times 3.65 = 30.8425 \text{ cm}^2$; lower bound = $8.35 \times 3.55 = 29.6425 \text{ cm}^2$
10. (a) Upper bound = $\frac{120.5}{15.35} = 7.850 \text{ m/s}$; lower bound = $\frac{119.5}{15.45} = 7.735 \text{ m/s}$
 (b) 7.8 m/s (2 s.f.), because both bounds round to 7.8 but not to the same 3 s.f. value
11. (a) Each year multiplies by 1.08, so after n years the multiplier is 1.08^n
 (b) $1.08^n > \frac{5}{3} \Rightarrow n > 6.64$, so 7 years (population $\approx 4.11 \times 10^4$)
12. $(\sqrt{8} + 2)^2 = 8 + 8\sqrt{2} + 4 = 12 + 8\sqrt{2}$; dividing by $\sqrt{2}$ gives $6\sqrt{2} + 8$, so $a = 6$, $b = 8$

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