

IGCSE Mathematics

Topic: Formulae — Substitution & Rearranging

Total: 40 marks

SECTION A — SUBSTITUTION (12 marks)

1. Evaluate $4a - 3b$ when $a = -2$, $b = 5$. (2 marks)
2. Evaluate $2x^2 - 5x + 1$ when $x = 3$. (2 marks)
3. Evaluate $(pq)/(2r)$ when $p = 6$, $q = 4$, $r = 2$. (2 marks)
4. Evaluate $\sqrt{n + 25}$ when $n = 11$. (1 mark)
5. The formula for density is $\rho = m/V$. Find ρ when $m = 360$ g and $V = 120$ cm³. (2 marks)
6. The formula for simple interest is $I = (PRT)/100$. Find I when $P = 500$, $R = 4\%$, $T = 3$ years. (3 marks)

SECTION B — REARRANGING FORMULAE (18 marks)

7. Make x the subject: $y = 7x - 9$. (2 marks)
8. Make h the subject: $A = 1/2 bh$. (2 marks)
9. Make r the subject: $V = \pi r^2 h$. (3 marks)
10. Make t the subject: $s = ut + 1/2 at^2$. (4 marks)
11. Make k the subject: $P = (5k + 8)/3$. (3 marks)
12. Make m the subject: $F = (3m - 2)/(m + 4)$. (4 marks)

SECTION C — MIXED APPLICATION (10 marks)

13. The formula for kinetic energy is $E = 1/2 mv^2$.
 - (a) Rearrange the formula to make m the subject. (3 marks)
 - (b) Use your formula to find m when $E = 450$ J and $v = 15$ m/s. (3 marks)

14. A formula for the period of a pendulum is $T = 2\pi \sqrt{L/g}$.

(a) Rearrange the formula to make L the subject. (2 marks)

(b) Calculate L when $T = 1.2$ s and $g = 9.8$ m/s². (2 marks)

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TEACHER-ONLY MARK SCHEME

SECTION A ANSWERS:

1. -23
2. 4
3. 6
4. 6
5. 3 g/cm^3
6. 60

SECTION B ANSWERS:

7. $x = (y + 9)/7$
8. $h = 2A/b$
9. $r = \sqrt{V/(\pi h)}$
10. $t = [-u \pm \sqrt{u^2 + 2as}]/a$
11. $k = (3P - 8)/5$
12. $m = (-2 - 4F)/(F - 3)$

SECTION C ANSWERS:

- 13(a) $m = 2E / v^2$
- 13(b) $m = 4 \text{ kg}$
- 14(a) $L = gT^2 / (4\pi^2)$
- 14(b) $L \approx 0.357 \text{ m}$