



## 5.6H Changing the Subject of a Formula: Higher Tier Practice

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 65 minutes

Total Marks

Name: \_\_\_\_\_ Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_

**Answer ALL questions. Show all your working.**

- 1** Make  $x$  the subject of the formula  $7x + 3y = 25$ . Give your answer in terms of  $y$ .

(Total for Question 1 is 2 marks)

- 2** Rearrange the formula  $p = 3/(2t + 5)$  to make  $t$  the subject. Give your answer in terms of  $p$ .

(Total for Question 2 is 3 marks)

- 3** The area  $A$  of a trapezium is given by  $A = (h/2)(a + b)$ , where  $a$  and  $b$  are the parallel sides and  $h$  is the height. Rearrange this formula to make  $h$  the subject. Then find  $h$  when  $A = 84$ ,  $a = 6$  and  $b = 10$ .

(a) Rearrange  $A = (h/2)(a + b)$  to make  $h$  the subject. (2)

(b) Find  $h$  when  $A = 84$ ,  $a = 6$  and  $b = 10$ . (2)

(Total for Question 3 is 4 marks)

- 4** Rearrange the formula for the frequency  $f$  of a wave:  $v = f * \lambda$ , to make  $\lambda$  the subject. Then a wave has speed  $v = 330$  m/s and frequency  $f = 440$  Hz. Calculate the wavelength  $\lambda$  to 3 significant figures.

**(a)** Make  $\lambda$  the subject of  $v = f * \lambda$ . **(1)**

**(b)** Calculate  $\lambda$  for  $v = 330$  m/s and  $f = 440$  Hz and give the answer to 3 significant figures. **(4)**

---

**(Total for Question 4 is 5 marks)**

- 
- 5** The formula for the period  $T$  of a pendulum of length  $L$  is  $T = 2\pi\sqrt{L/g}$ , where  $g$  is gravitational acceleration. Show that  $L = gT^2/(4\pi^2)$ . (You do not need to evaluate numerically.)

**(Total for Question 5 is 6 marks)**

**6** A formula relates the concentration  $C$  (in g/L) of a solution to mass  $m$  (in g) and volume  $V$  (in L):  $C = m/V$ . Rearrange this formula to make  $m$  the subject. Then a chemist has a solution with concentration 0.12 g/L and volume 250 mL. Calculate the mass  $m$  in grams. Give your answer to 2 decimal places. (Note: 1 L = 1000 mL.)

**(a)** Make  $m$  the subject of  $C = m/V$ . (1)

**(b)** Calculate  $m$  when  $C = 0.12$  g/L and  $V = 250$  mL. Give your answer to 2 decimal places. (5)

---

(Total for Question 6 is 6 marks)

## Mark scheme · 5.6H Changing the Subject of a Formula: Higher Tier Practice

---

### Question 1

- **M1** subtract  $3y$  from both sides or equivalent to isolate  $7x$
- **A1**  $x = (25 - 3y)/7$  cao
- **Answer:**  $x = (25 - 3y)/7$

### Question 2

- **M1** multiply both sides by  $(2t + 5)$ :  $p(2t + 5) = 3$  or equivalent
- **M1** expand or collect terms to isolate  $t$ :  $2pt + 5p = 3 \rightarrow 2pt = 3 - 5p$
- **A1**  $t = (3 - 5p)/(2p)$  cao
- **Answer:**  $t = (3 - 5p)/(2p)$

### Question 3

- (a) **M1** multiply both sides by 2 then divide by  $(a + b)$ :  $2A = h(a + b)$  or equivalent
- (a) **A1**  $h = 2A/(a + b)$  cao
- (a) **Answer:**  $h = 2A/(a + b)$
- (b) **M1** substitute values into  $h = 2A/(a + b)$ :  $h = 2 \cdot 84/(6 + 10)$
- (b) **A1**  $h = 168/16 = 10.5$  cao
- (b) **Answer:** 10.5

### Question 4

- (a) **B1**  $\lambda = v/f$  cao
- (a) **Answer:**  $\lambda = v/f$
- (b) **M1** substitute values and divide:  $\lambda = 330/440$
- (b) **A1** 0.75 cao
- (b) **B1** units m stated or implied
- (b) **SC1** answer correct to 3 s.f. (0.75) award
- (b) **Answer:** 0.75 m

### Question 5

- **M1** divide both sides by  $2\pi$  to isolate the square root:  $T/(2\pi) = \sqrt{L/g}$  or equivalent
- **M1** square both sides to remove the square root:  $T^2/(4\pi^2) = L/g$
- **M1** multiply both sides by  $g$ :  $g \cdot T^2/(4\pi^2) = L$
- **M1** reorder to the conventional form  $L = gT^2/(4\pi^2)$  or state equivalent algebraic rearrangement
- **A1**  $L = gT^2/(4\pi^2)$  cao
- **C1** communication: algebraic justification shown clearly, steps shown and logically ordered
- **Answer:**  $L = gT^2/(4\pi^2)$

### Question 6

- (a) **B1**  $m = CV$  cao
- (a) **Answer:**  $m = CV$
- (b) **M1** convert 250 mL to 0.25 L and substitute:  $m = 0.12 \cdot 0.25$
- (b) **M1** multiply to get 0.03
- (b) **A1** 0.03 cao
- (b) **B1** round to 2 decimal places correctly: 0.03 (awrt) or 0.03
- (b) **B1** units g stated or implied
- (b) **Answer:** 0.03 g