

EXERCISES ON ALGEBRAIC MODELLING Working

SECTION I
MULTIPLE CHOICE (20 MARKS)

- 1 Use the formula $s = ut + \frac{1}{2}at^2$ to find s when $u = 10$, $t = 4$, $a = 7$.
 A 68 B 96
 C 166 D 666
- 2 Solve the equation $\frac{3x-4}{4} = 5$.
 A $\frac{16}{3}$ B 8
 C 9 D 12
- 3 Simplify $\frac{x^4}{4x^3} \div x$.
 A $\frac{1}{4}$ B $\frac{1}{x^2}$
 C x^2 D 4
- 4 Simplify $\left(\frac{x^6}{x^2}\right)^3$.
 A x^3 B x^6
 C x^2 D x^{12}
- 5 Use the formula $h = 8 + \frac{18-a}{2}$ to find a if $h = 12$.
 A 6 B 8
 C 10 D 12
- 6 The equal sides of an isosceles triangle are each 3cm longer than the third side. The third side has a length of x cm. What is the perimeter of the triangle?
 A $(3x + 6)$ cm B $(3x - 3)$ cm
 C $(3x + 3)$ cm D $6x$ cm
- 7 The volume of a sphere is given by $V = \frac{4}{3}\pi r^3$. If $V = 200\text{cm}^3$, find r to the nearest millimetre.
 A 30mm B 36mm
 C 60mm D 72mm
- 8 Solve for x , $\frac{x-3}{3} - \frac{x-1}{4} = 2$
 A 7 B 14
 C 24 D 33
- 9 The base length l of a square pyramid of volume V and perpendicular height h is given by $l = \sqrt{\frac{3V}{h}}$. Find l correct to 1 decimal place if $V = 835$ and $h = 10.5$
 A 5.6 B 15.4
 C 360.7 D 650.2
- 10 Solve the equation $3x - 5 = \frac{x}{2}$.
 The solution is:
 A $x = 1$ B $x = 2$
 C $x = 3$ D $x = 5$
- 11 A number is decreased by 5 and then this amount is doubled. The result is 62. Which of these equations represents this information?
 A $5 - 2x = 62$ B $2x - 5 = 62$
 C $2(5 - x) = 62$ D $2(x - 5) = 62$
- 12 Simplify $3(2x - 1) - 2(x - 2)$
 A $4x + 1$ B $4x + 2$
 C $4x + 3$ D $4x + 4$

- 13 Solve $\sqrt{9m} = 9$
 A $m = \frac{1}{3}$ B $m = 1$
 C $m = 3$ D $m = 9$
- 14 Solve $\frac{2x-3}{2} = \frac{2x}{3}$
 A $x = \frac{11}{13}$ B $x = \frac{9}{2}$
 C $x = \frac{9}{4}$ D $x = \frac{3}{4}$
- 15 Simplify $2(2x-1) - 3(x-2)$
 A $x + 2$ B $x + 3$
 C $x + 4$ D $x - 2$
- 16 $V = \sqrt{a^2 + 2as}$ Find the value of V given that $u = 3$, $a = 2$, $s = 4$
 A 3 B 5
 C 7 D 9
- 17 What is the gradient of the line that passes through the points $(-2, 0)$ and $(0, 4)$?
 A $\frac{1}{2}$ B 2
 C $-\frac{1}{2}$ D -2
- 18 Which of the following is a linear equation?
 A $y = x^2 + 7$ B $y = 5 - \frac{7}{x}$
 C $y = 3x - 2$ D $y = \sqrt{x} - 5$
- 19 The graph $3x + y = 9$ cuts the x -axis at the point
 A $(3, 0)$ B $(0, 3)$
 C $(0, 9)$ D $(9, 0)$
- 20 What is the gradient of the line represented by the equation $3x - 5y = 5$?
 A $\frac{3}{5}$ B $\frac{5}{3}$
 C 3 D -5

END OF MULTIPLE CHOICE SECTION
GO ON TO SECTION II

Show full working

SECTION II (72 MARKS)

Show all necessary working.

Each question is worth 12 marks.

21 (12 MARKS)

If $V = u + at$, find:

A V if $u = 9$, $a = 9.8$ and $t = 4.5$ 2

B a if $V = 0.5$, $u = 11.6$ and $t = 3$ 2

C The formula, $t = \frac{m_1 - m_2}{1 + m_1 m_2}$ is 2

used to find the angle between two straight lines with gradients m_1 and m_2 . Find the value of t if $m_1 = \frac{1}{2}$ and $m_2 = -\frac{1}{3}$

D Solve the following equations:

i) $5 = \frac{20 + y}{4}$ 2

ii) $5(2x - 1) - (x - 3) = 5$ 2

iii) $\sqrt{2x + 1} = 3$ 2

(12 MARKS)

22 Write the gradient and the y -intercept of the following equations:

A $y = 5x - 7$ 2

B $2x + 3y - 4 = 0$ 2

C $\frac{x - 5}{2} + \frac{5x}{4} = x - 1$ 2

D $\frac{3x - 5}{4} = 1 - \frac{x - 3}{5}$ 2

E The side s of a square with diagonal D , is given by the formula $s^2 = \frac{D^2}{2}$.

Find, to the nearest cm, the length of a side of a square with a diagonal of 56cm.

F Given $c = kd^2$, find c if $k = 0.6$ and $d = 1.35 \times 10^4$ 2

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A Simplify the following:

i) $x^2 + 7$ 3

ii) $(x + 7)^2$

iii) $7x^2$

B If $V^2 = u^2 + 2as$, find s if $V = 24$, $u = 16$ and $a = 10$

C Evaluate $x^3 + y^2$ if $x = 8$ and $y = 64$

D Solve $\sqrt{2x + 3} = 7$ 1

E Simplify $5(3x + 7) - 2(2x - 5)$ 1

F Simplify $\frac{3x}{7} + \frac{x}{5}$ 1

G Solve for x , $3x - 5 = 16$ 1

H $5(x - 6) = 2(2x - 3)$ 1

I $3x = -5(1000 - x)$ 2

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A Given $E = m^2$ find m in scientific notation correct to two significant figures, if $E = 9.6 \times 10^{15}$ and $c = 4 \times 10^7$ 2

B If $T^5 = 1.85 \times 10^6$, find T , giving your answer correct to 2 decimal places.

Solve the following equations. Show all necessary working.

C $2(x - 4) + 3(x + 3) = 36$ 2

D $x + 4 = \frac{2x - 3}{3}$ 2

E $\frac{1}{3} \frac{2x - 4}{3} = 6$ 2

F $\frac{x + 15}{x + 3} = \frac{5}{7}$ 2