

FORM 3 PROMOTION EXAMINATION 2009: MATHEMATICS

1. C (1) ✓
2. A (1) ✓
3. B (1) ✓
4. D (1) ✓
5. B (1) ✓
6. C (1) -
7. A (1) -
8. D (1) -
9. C (1) -
10. B (1) ✓

10

11. $p \propto (t+1)^3$
 $p = k(t+1)^3$ (1)

$p = 16$ when $t = 1$
 $16 = k(1+1)^3$ (1)
 $16 = 8k$
 $2 = k$ (1)

$p = 2(t+1)^3$ (1)
 $t = 3$
 $p = 2(3+1)^3$
 $= 128$ (1)

5

12. Value at end of Y_1
 $= \frac{80}{100} \times \$40,000$ (1)
 $= \$32,000$ (1)

OR Depreciation $\dots \dots \dots Y_1 = \frac{20}{100} \times \$40,000$
 $= \$8,000$ (1)

Value at end of $Y_1 = \$40,000 - \$8,000$
 $= \$32,000$ (1)

Value at end of Y_2
 $= \frac{80}{100} \times \$32,000$ (1)
 $= \$25,600$ (1)

Depreciation $\dots \dots \dots Y_2 = \frac{20}{100} \times \$32,000$
 $= \$6,400$ (1)

Value at end of $Y_2 = \$32,000 - \$6,400$
 $= \$25,600$ (1)

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13. a) (i) Total tax-free Allowances

$$\begin{aligned} &= \$5,000 + \frac{5}{100} \times \$28,500 \quad (1) + (1) \\ &= \$5,000 + \$1,425 \quad (1) \text{ For } 1425 \\ &= \$6,425 \quad (1) \end{aligned}$$

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(ii) Taxable Income

$$\begin{aligned} &= \$28,500 - \$6,425 \\ &= \$22,075 \end{aligned}$$

(1)

1

b) Income Tax Paid

$$\begin{aligned} &= \frac{8}{100} \times \$20,000 + \frac{12}{100} \times \$2,075 \quad (1) + (1) \\ &= \$1,600 + \$249 \quad (1) + (1) \\ &= \$1,849 \quad (1) \text{ c.a.o} \end{aligned}$$

5

14. i) P (1, 4) (1)
Q (2, 6) (1)

2

$$\begin{aligned} \text{ii) Length } PQ &= \sqrt{(6-4)^2 + (2-1)^2} \quad (1) \\ &= \sqrt{2^2 + 1^2} \\ &= \sqrt{5} \text{ units} \\ &= 2.24 \text{ (3 sig. figs)} \end{aligned}$$

(1)

2

$$\begin{aligned} \text{iii) Midpoint of } PQ &= \left(\frac{1+2}{2}, \frac{4+6}{2} \right) \quad (1) \\ &= \left(\frac{3}{2}, 5 \right) \quad (1) \end{aligned}$$

(1)

2

$$\begin{aligned} \text{iv) Gradient of } PQ &= \frac{6-4}{2-1} \quad (1) \text{ OR From Diagram } \frac{2}{1} \quad (1) \\ &= 2 \quad (1) \end{aligned}$$

= 2

2

$$\text{v) Grad. of perpendicular} = -\frac{1}{2} \quad (1)$$

$$\text{Eqn of perpendicular } \frac{y-5}{x-\frac{3}{2}} = -\frac{1}{2} \quad (1)$$

$$2y - 10 = -x + \frac{3}{2} \quad (1)$$

$$4y - 20 = -2x + 3$$

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$$4y = -2x + 23$$

$$\text{OR } y = -\frac{1}{2}x + \frac{23}{4} \quad \textcircled{1} \text{ c.a.o}$$

[4]

OR Using $y = mx + c$

$$5 = -\frac{1}{2} \left(\frac{3}{2} \right) + c$$

① for gradient $(-\frac{1}{2})$

① for sub. correctly

$$5 = -\frac{3}{4} + c$$

$$5\frac{3}{4} = c$$

①

$$\text{Eq}^n \text{ is } y = -\frac{1}{2}x + 5\frac{3}{4} \quad \textcircled{1} \text{ c.a.o}$$

15. $5x - 3y = 18 \quad \textcircled{1}$

$3x + 2y = 7 \quad \textcircled{II}$

$5x - 3y = 18 \quad \times 2 \quad \textcircled{1}$

$3x + 2y = 7 \quad \times 3 \quad \textcircled{1}$

$10x - 6y = 36 \quad \textcircled{1}$

$9x + 6y = 21 \quad \textcircled{1}$

$19x = 57 \quad \textcircled{1}$

$x = 3 \quad \textcircled{1}$

sub. into ①

$5(3) - 3y = 18 \quad \textcircled{1}$

$-3y = 3$

$y = -1 \quad \textcircled{1}$

[8]

16.

$$i) 4\pi r^2 = 616$$

$$4 \times \frac{22}{7} \times r^2 = 616 \quad (1)$$

$$r^2 = \frac{616 \times 7}{88} \quad (1)$$

$$= 49$$

$$r = 7 \text{ cm} \quad (1)$$

3

$$ii) V = \frac{4}{3}\pi r^3$$

$$= \frac{4}{3} \times \frac{22}{7} \times \frac{7^3}{1} \quad (1)$$

$$= \frac{4312}{3}$$

$$= 1437 \frac{1}{3} \text{ cm}^3 \quad (1)$$

2

$$17. i) \text{ No. of students, } \Sigma f = 7 + 23 + 39 + 23 + 18$$

$$= 110$$

(1)

11

$$ii) \text{ Modal Class} = (45 - 54) \text{ kg}$$

(1)

11

$$iii) \Sigma (f \times x) = (7 \times 29.5) \quad (1)$$

$$+ (23 \times 39.5) \quad (1)$$

$$+ (39 \times 49.5) \quad (1)$$

$$+ (23 \times 59.5) \quad (1)$$

$$+ (18 \times 69.5) \quad (1)$$

$$\hline 5665$$

$$\text{Mean Weight, } \bar{x} = \frac{\Sigma fx}{\Sigma f}$$

$$= \frac{5665}{110} \quad (1)$$

$$= 51.5 \text{ kg} \quad (1)$$

7

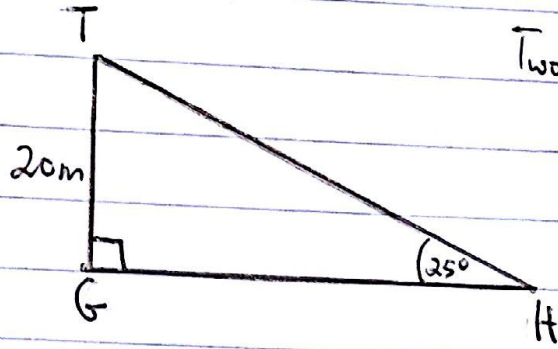
$$iv) P(\text{A student chosen at random weighs AT MOST 44 kg}) = \frac{30}{110}$$

$$= \frac{3}{11}$$

11

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18. i)



Two of T, G, H seen in a triangle ①

20m seen ①

25° seen ①

3

$$\text{ii) } \sin 25^\circ = \frac{20\text{m}}{TH} \quad ①$$

$$TH = \frac{20\text{m}}{\sin 25^\circ} \quad ①$$

$$= 47.3\text{m (3 sig. fig.)} \quad ①$$

3