

Paper 3 Nov. 23

$$1) \begin{array}{ccccc} -1 & 6 & 13 & 20 & 27 \\ 7 & 7 & 7 & 7 & 7 \end{array}$$

$$n^{\text{th}} \text{ term} = 7n - 1$$

$$2) \begin{array}{l} 12 \times f = 8 \\ \text{scale factor } f = \frac{2}{3} \end{array}$$

$$3) \begin{array}{l} 7.5 \leq \text{length} < 8.5 \\ \text{cm.} \quad \text{cm} \end{array}$$

$$4) \begin{array}{l} y = x^3 - 1 \\ \text{at } x = 1 \quad y = 0 \\ \text{at } x = 0 \quad y = -1 \\ \text{crosses } y \text{ axis at } (0, -1) \end{array}$$

$$5) \begin{array}{r} 26000 \times 1.06 \quad 0.01 \\ + 4000 \times 1.09 \\ \hline 30000 \end{array}$$

$$\Rightarrow \frac{64\%}{4\%} \text{ increase}$$

$$6) \begin{array}{l} 240 \times \frac{2}{5} \times 172 \\ = 16512 \end{array}$$

$$\frac{29760 - 16512}{240 \times \frac{3}{5}} = 92 \text{ visitors/hr.}$$

$$7) 3^{\text{rd}} \text{ cube} = 27$$

Possible primes (not 2)

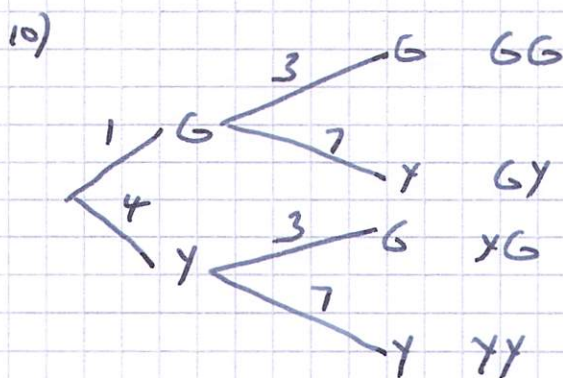
$$3 \ 5 \ 7 \ 11 \ 13 \ 17 \ 19 \ 23$$

$$3 \ 5 \text{ and } 17$$

$$8) \begin{array}{l} 5.30\dot{4} = 5.30444\ldots \\ 5.344 \\ 5.34 \\ 5.34444\ldots \end{array}$$

$$\text{largest is } 5.3\dot{4}$$

$$9) \begin{array}{l} \cos W = \frac{6.7}{8.3} \\ W = \cos^{-1} \frac{6.7}{8.3} \\ = 36.2^\circ \text{ (3 s.f.)} \end{array}$$



$$\begin{array}{l} P(\text{both green}) = \frac{1}{5} \times \frac{3}{5} \\ = \frac{3}{25} \end{array}$$

$$\begin{aligned} 11) \quad 7x + 2y &= 100 \\ 3x + 2y &= 48 \end{aligned}$$

$$\text{subtract } 4x = 52$$

$$x = 13 \quad \checkmark$$

$$y = 4\frac{1}{2} \quad \checkmark$$

$$\text{check. } 7 \times 13 + 9 = 100 \quad \checkmark$$

$$12) \quad r + 3r + 72 = 180$$

$$r = \frac{180 - 72}{4}$$

$$= 27$$

$$p = 81^\circ \quad \checkmark$$

$$13) \quad \begin{aligned} a) \quad \text{work from home} \\ \text{max. possible} &= 21 \quad \checkmark \end{aligned}$$

$$b) \quad P(\text{at least } 10m) = \frac{37+18}{100}$$

$$= \frac{55}{100}$$

$$= \frac{11}{20} \quad \checkmark$$

$$c) \quad \begin{array}{l} \text{distance freq. freq. den.} \\ \text{width} \end{array}$$

1st	5	21	4.2	✓
2nd	5	24	4.8	✓
3rd	10	37	3.7	✓
4th	20	18	0.9	✓

and draw bars.

$$14) \quad \begin{aligned} a) \quad \text{Vol. whole pyramid} \\ &= \frac{1}{3} \times 64 \times 16 \end{aligned}$$

$$\text{Vol small pyramid}$$

$$= \frac{1}{3} \times 25 \times 10$$

$$\text{Vol stand} = \frac{1}{3} (64 \times 16 - 25 \times 10)$$

$$= 258 \text{ cm}^3 \quad \checkmark$$

$$b) \quad \text{density} = \frac{\text{volume}}{\text{weight}} \frac{\text{weight}}{\text{volume}}$$

$$7.5 = \frac{2340}{\text{vol.}}$$

$$\text{volume} = \frac{2340}{7.5}$$

$$\text{Vol. Player} = \frac{312 \text{ cm}^3}{54 \text{ cm}^3} \quad \checkmark$$

$$15) \quad 2a + b = \begin{pmatrix} 2m \\ 6 \end{pmatrix} + \begin{pmatrix} -4 \\ p \end{pmatrix} = \begin{pmatrix} 8 \\ 5 \end{pmatrix}$$

$$2m - 4 = 8 \quad m = 6 \quad \checkmark$$

$$6 + p = 5 \quad p = -1 \quad \checkmark$$

$$16) \quad pQ^2 + QP^2 = 10^2$$

$$pQ^2 = \frac{10^2}{2}$$

$$= 50$$

$$pQ = \sqrt{50}$$

$$\text{radius} = \frac{\sqrt{50}}{2}$$

$$= 3.54 \text{ cm.} \quad \checkmark$$

(3 s.f.)

17) x coordinate

$$= \frac{a+b}{2}$$

$$\left\{ \text{or } a + \frac{b-a}{2} \right\}$$

18) $\frac{2(x+4)^5}{(x+4)^3}$

$$= 2(x+4)^2$$

$$= 2(x^2 + 8x + 16)$$

$$= 2x^2 + 16x + 32$$

19)

$\Delta 1$ BAE

$\Delta 2$ DCE

CE = EA side

$\angle BEA = \angle DEC$ angle

BE = DE side

Triangles congruent
(SAS)

20) $2x(x+10) = 5x-18$

$$2x^2 + 20x = 5x - 18$$

$$2x^2 + 15x + 18 = 0$$

$$(2x+3)(x+6) = 0$$

$$x = -\frac{3}{2}$$

$$\text{or } x = -6$$

21)

Container is D.

Mid volume slower rate
so diameter widest
at this point.

$$\text{rate}_{(10)} = \frac{35(12.5 - 2)}{35}$$

$$= 0.3 \text{ cm/sec.}$$

22) $\frac{7}{2a^2} - \frac{3}{5a}$

$$= \frac{7 \times 5a - 3 \times 2a^2}{10a^3}$$

$$= \frac{35a - 6a^2}{10a^3}$$

$$= \frac{35 - 6a}{10a^2} \quad a \neq 0$$

23) Surface area is

$$2 \times \left(\frac{3\sqrt{3}x^2}{2} \right) + 30x^2 < 650$$

$$x^2(3\sqrt{3} + 30) < 650$$

$$x^2 < \frac{650}{3\sqrt{3} + 30}$$

$$x^2 < 18.46$$

$$x < \sqrt{18.46}$$

$$x < 4.297$$

integer $x = 4$

$$24) \angle BAC = 51^\circ$$

$$\text{Area} = \frac{1}{2} AB \times BC \sin 56^\circ$$

$$\frac{BC}{\sin 51^\circ} = \frac{24}{\sin 73^\circ}$$

$$BC = \frac{\sin 51^\circ \times 24}{\sin 73^\circ}$$

$$\begin{aligned} \text{Area} &= \frac{1}{2} 24 \times \frac{24 \sin 51^\circ}{\sin 73^\circ} \sin 56^\circ \\ &= 194 \text{ cm}^2 \quad \checkmark \end{aligned}$$

$$25) \text{ if } 6b = 5c$$

$$b : c$$

$$5 : 6$$

and adding in a

$$a : b : c$$

$$\frac{3}{4} 6 \quad 5 \quad 6$$

$$18 : 20 : 24$$

$$9 : 10 : 12 \quad \checkmark$$

26) Combinations to get 10

$$5 + 5$$

$$\frac{4}{8} \times \frac{3}{7}$$

$$5 + 3 + 2$$

$$\frac{4}{8} \times \frac{2}{7} \times \frac{1}{6}$$

$$5 + 2 + 3$$

..

$$3 + 5 + 2$$

..

$$3 + 2 + 5$$

..

$$2 + 5 + 3$$

..

$$2 + 3 + 5$$

..

$$P(\text{win}) = \frac{4}{8} \times \frac{3}{7} + 6 \left(\frac{4}{8} \times \frac{2}{7} \times \frac{1}{6} \right) = \frac{17}{14} \times \frac{5}{14}$$

27) a)

Translation vector is $\begin{pmatrix} 2 \\ 0 \end{pmatrix}$

b) reflection in y axis

$$x \rightarrow -x$$

reflected line is

$$\underline{-5x + 4}$$