



## 2020 O Level Mathematics Paper 1 Suggested Answers

1.  $-1.457$

$\hat{=} -1.46$  (3sf)

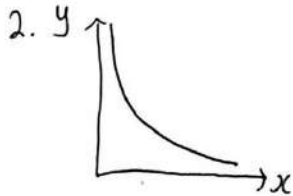


Diagram 3

$$y = \frac{k}{x^2}$$

As  $x$  increases,  $y$  decreases.

$x$  cannot be zero as  $\frac{k}{0}$  is undefined.

3.  $\angle OBA = 90^\circ$  (radius  $OB \perp$  tangent  $AB$ )

$$\begin{aligned}\angle CBA &= \angle OBC + \angle OBA \\ &= 66^\circ + 90^\circ \\ &= 156^\circ\end{aligned}$$

$$\begin{aligned}\angle OAB &= 180^\circ - \angle CBA \\ &= 180^\circ - 156^\circ \\ &= 24^\circ \text{ (interior angles; } CB \parallel OA \text{)}\end{aligned}$$

4 (a) The vertical axis did not start from zero.

(b) The reader may think that the total daily newspaper circulation has fallen to nearly zero in 2016, when it has actually fallen to 1.25 million in 2016.



$$5. (a) \quad 4^5 = (2^2)^5 \\ = 2^{10}$$

$$(b) \quad \frac{4a^2}{3b} \div \frac{10ab}{21} \\ = \frac{4a^2}{3b} \times \frac{21}{10ab} \\ = \frac{84a^2}{30ab^2} \\ = \frac{14a}{5b^2}$$

6. Perimeter hexagon : Perimeter triangle

$$1 : 2$$

Perimeter hexagon  $\Delta$  : perimeter triangle

$$\frac{1}{2} : 2$$

$$1 : 4$$

Area hexagon  $\Delta$  : Area triangle

$$(1)^2 : (4)^2$$

$$1 : 16$$

Area hexagon : Area triangle

$$6 : 16$$

$$3 : 8$$



7.(a) Median  $\rightarrow$  12<sup>th</sup> man

$\therefore$  83 minutes

(b)  $102 - 33 = 69$  minutes

$75 + 33 = 108$  minutes

8. (a)  $p(\text{yellow}) = 1 - p(\text{red}) - p(\text{blue})$

$$= 1 - 0.45 - 0.3$$

$$= 0.25$$

(b)  $0.45 - 0.3 = 0.15$

$$0.15 \rightarrow 9$$

$$1 \rightarrow \frac{9}{0.15}$$

$$= 60$$

9.  $\frac{x}{5} - \frac{2x-3}{4} = -3$

$$\frac{4(x)}{20} - \frac{5(2x-3)}{20} = \frac{-3(20)}{20}$$

$$4x - 5(2x-3) = -60$$

$$4x - 10x + 15 = -60$$

$$-6x = -75$$

$$x = 12.5$$



$$\begin{aligned} 10. (a) \quad & x^2 + 9x - 4 \\ &= x^2 + 9x + \left(\frac{9}{2}\right)^2 - \left(\frac{9}{2}\right)^2 - 4 \\ &= \left(x + \frac{9}{2}\right)^2 - \frac{81}{4} - 4 \\ &= \left(x + \frac{9}{2}\right)^2 - \frac{97}{4} \end{aligned}$$

(b)  $x$ -value:

$$x + \frac{9}{2} = 0$$

$$x = -\frac{9}{2}$$

$y$ -value:

$$-\frac{97}{4}$$

$$\therefore \left(-\frac{9}{2}, -\frac{97}{4}\right)$$

$$\begin{aligned} 11. (a) \quad & T_1 + d(n-1) \\ &= 11 + 9(n-1) \\ &= 9n - 9 + 11 \\ &= 9n + 2 \end{aligned}$$

$$(b) \quad 9n + 2 = 335$$

$$9n = 333$$

$$n = 37$$



12. 5 units  $\rightarrow$  \$285

$$3 \text{ units} \rightarrow \frac{285}{5} \times 3$$
$$= \$171 \text{ (Kim)}$$

$$2 \text{ units} \rightarrow \frac{285}{5} \times 2$$
$$= \$114 \text{ (Pat and Xin)}$$

Let the amount Pat received be  $x$ .

Let the amount Xin received be  $x - 24$ .

$$x + x - 24 = \$114$$

$$2x = \$138$$

$$x = \$69 \text{ (Pat)}$$

$$\text{Xin} = \$69 - \$24$$

$$= \$45 \text{ (Xin)}$$

13. (a) When  $x = -2$ ,

$$y = 16 - 4(-2)^2$$

$$= 16 - 4(4)$$

$$= 16 - 16$$

$$= 0$$

(b)  $y = 16 - 4x^2$

$$4x^2 = 16 - y$$

$$x^2 = \frac{16 - y}{4}$$

$$x = \pm \sqrt{\frac{16 - y}{4}}$$



14.  $100\% - 16\% = 84\%$   
 $84\%$  of water  $\rightarrow 378\text{-l}$   
 $100\%$  of water  $\rightarrow \frac{378}{84} \times 100$   
 $= 450\text{-l}$   
 $60\%$  of tank  $\rightarrow 450\text{-l}$   
 $100\%$  of tank  $\rightarrow \frac{450}{60} \times 100$   
 $= 750\text{-l}$

15. Total =  $P(1 + \frac{r}{100})^n$   
 $\$1120 = \$850(1 + \frac{r}{100})^2$   
 $1.318 = (1 + \frac{r}{100})^2$   
 $(1.318)^{\frac{1}{2}} = 1 + \frac{r}{100}$   
 $1.0233 = 1 + \frac{r}{100}$   
 $0.0233 = \frac{r}{100}$   
 $2.33 = r$



16 (a) (i)  $A \cap B = \{s, a, r, e\}$

(ii)  $(A \cup B)' = \emptyset$  or  $\{ \}$

(b)  $(P \cap Q)'$  or  $P' \cup Q'$

17. (a) 1 : 2000 000

1 cm : 20000 m

$\times 47.5 \left( \begin{array}{l} 1 \text{ cm} : 20 \text{ km} \\ 47.5 \text{ cm} : 950 \text{ km} \end{array} \right) \times 47.5$

Ans: 47.5 cm

(b) 1 cm : 20 km

1 cm<sup>2</sup> : 400 km<sup>2</sup>

$827.0075 \text{ cm}^2 : 330803 \text{ km}^2 \left. \vphantom{827.0075} \right) \times 827.0075$

Ans: 827.0075 cm<sup>2</sup>

18. Angle of elevation  $\rightarrow \angle ADB$

$$\tan \angle ACB = \frac{AB}{BC}$$

$$\tan 36^\circ = \frac{45}{BC}$$

$$BC = 61.94 \text{ m}$$

$$BD = 61.94 + 22$$

$$= 83.94 \text{ m}$$

$$\tan \angle ADB = \frac{45}{83.94}$$

$$\angle ADB = 28.196 \approx 28.2^\circ (1 \text{ dp})$$



$$19. (a) \quad 3(3x+2y) - 5(x-3y)$$

$$= 9x + 6y - 5x + 15y$$

$$= 4x + 21y$$

$$(b) \quad 12ab - 9ax - 8by + 6xy$$

$$= 3a(4b - 3x) - 2y(4b - 3x)$$

$$= (3a - 2y)(4b - 3x)$$

$$20(a) \quad \begin{array}{r} 2 \overline{)1188} \\ \underline{2} \phantom{00} \\ 1 \phantom{00} \end{array}$$

$$\begin{array}{r} 2 \overline{)594} \\ \underline{4} \phantom{00} \\ 1 \phantom{00} \end{array}$$

$$\begin{array}{r} 3 \overline{)297} \\ \underline{6} \phantom{00} \\ 2 \phantom{00} \end{array}$$

$$\begin{array}{r} 3 \overline{)99} \\ \underline{6} \phantom{00} \\ 3 \phantom{00} \end{array}$$

$$\begin{array}{r} 3 \overline{)33} \\ \underline{3} \phantom{00} \\ 0 \phantom{00} \\ 11 \end{array}$$

$$\text{Ans} = 2^2 \times 3^3 \times 11$$

$$(b)(i) \quad \text{LCM of } p \text{ and } p^2 \rightarrow 2^2$$

$$p^2 = 2^2$$

$$p = 2$$

$$\text{LCM of } q^{r+2} \text{ and } q^r \rightarrow 3^3$$

$$q^{r+2} = 3^3$$

$$q = 3$$

$$r+2 = 3$$

$$r = 1$$

$$(ii) \quad \text{HCF} = 2 \times 3 \times 11$$

$$= 66$$





- 21 (a) Angle  $EDC = 102^\circ$  because Angle  $EDC + \text{Angle } DEA = 180^\circ$   
(interior angles;  $AE$  parallel to  $CD$ ).

Angle  $BCD = 96^\circ$  because the sum of angles in pentagon  $ABCDE$  is  $540^\circ$ .

- (b) Angle  $BAC = 18^\circ$  (base angle of isos. triangle)  
Angle  $EAC = 102^\circ$   
Angle  $EAC + \text{Angle } DEA = 180^\circ$   
Angle  $EAC$  and Angle  $DEA$  are interior angles;  $ED$  parallel to  $AC$   
Therefore  $ACDE$  is a parallelogram.



$$22. (a) \angle BGD = \angle BAG$$

$$\tan \angle BGD = \tan \angle BAG$$

$$\frac{BD}{BG} = \frac{BG}{BA}$$

$$\frac{BD}{36} = \frac{36}{24}$$

$$BD = 54 \text{ m}$$

$$(b) \text{ACFE} = \frac{1}{2} \times (FC + EA) \times DA$$

$$= \frac{1}{2} \times (FC + 30) \times (37 + 24) = 1586 \text{ m}^2$$

$$(FC + 30) \times 61 = 3172$$

$$FC + 30 = 52$$

$$FC = 22 \text{ m}$$

$$DC = BD - CB$$

$$= 54 - 37$$

$$= 17 \text{ m}$$

$$\text{Area } \triangle DCF = \frac{1}{2} \times 22 \times 17$$

$$= 187 \text{ m}^2$$

$$\text{Area } \triangle DBG = \frac{1}{2} \times 54 \times 36$$

$$= 972 \text{ m}^2$$

$$\text{Area } \triangle GBA = \frac{1}{2} \times 36 \times 24$$

$$= 432 \text{ m}^2$$

$$\text{Total area} = 187 + 972 + 432 + 1586$$

$$= 3177 \text{ m}^2$$



$$\begin{aligned} 23. (a) \text{ Mean} &= \frac{\sum fx}{\sum f} \\ &= \frac{6(2.5) + 13(7.5) + 32(11.5) + 62(14.5) + 22(18) + 5(22.5)}{6 + 13 + 32 + 62 + 22 + 5} \\ &= 13.49 \\ &\approx 13.5 \text{ (3sf)} \end{aligned}$$

$$(b) (i) \quad 100\% - 40\% = 60\%$$

$$\frac{60}{100} \times 140 = 84$$

84 adults watch less than 14.75 hours of TV.

Ans: 14.75

(ii) 12 adults watch less than 8 hours of TV.

60 adults watch less than 13.5 hours of TV.

$$60 - 12 = 48 \text{ adults}$$

$$\frac{48}{140} = \frac{12}{35}$$