JUNE 2024 SUGGESTED ANSWERS
(from MathScienceExplained)

1 a) (i) $\frac{2}{100} \times 1550 = \$31$

Gross Salary = $205 + $31

= $236,00

(ii) Net Salary = Gross salary — deductions

Deductions = $3,90 + $1,65 +

$+\$4{,}50 = \$10{,}05$

Net salary $= \$236 - \$10{,}05$

$= \$225{,}95$

b) $(n-2)180 = 2(360)$

$$\frac{(n-2)180}{180} = \frac{720}{180}$$

$n-2 = 4$

$n = 6$ sides

2 (a) $6x - 2 = 2x + 8$

$6x - 2x = 8 + 2$

$\frac{4x}{4} = \frac{10}{4} = 2\frac{1}{2}$ or $2,5$

b) (i) $5(h^2 - 4k^2)$

$\Rightarrow 5(h - 2k)(h + 2k)$

(ii) $m(2p - 1) - 3n(2p - 1)$

$\Rightarrow (2p - 1)(m - 3n)$

c) $\frac{3}{x-y} - \frac{2}{x+y}$ $\Rightarrow$ $\frac{3(x+y)-2(x-y)}{(x-y)(x+y)}$

$\Rightarrow$ $\frac{3x+3y-2x+2y}{(x-y)(x+y)}$

$\Rightarrow$ $\frac{x+5y}{(x-y)(x+y)}$

3(a) 14minutes + 15minutes = 29 minutes

b) 4 weeks 3 days
- 2 weeks 5 days
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1 week 5 days

c) 4,5 x 2 (to and from school)
=) 9 x 5 = 45km

d) (i) $(4,52 \times 10^7) - (8,7 \times 10^6)$
$10^6(4,52 \times 10^1 - 8,7)$

$10^6 (3,65)$

$3,65 \times 10^1 \times 10^6$

$3,65 \times 10^7$

OR

45 200 000 − 8700 000

=) 36 500 000

=) $3,65 \times 10^7$

(ii) $8,7 \times 10^6$ in ordinary form

is 8 700 000

$\Rightarrow \frac{40}{100} \times 8\ 700\ 000$

3 480 000

4(a) $0,35 + 0\ 25 = 0,60$

$0,3 \times 0,04 = 0,012$

$\Rightarrow \frac{0,60}{0,012}$

$\Rightarrow 50$

b) $4 \times 5^1 + 3 \times 5^0 = 20 + 3 = 23$

2	23
2	11 r 1
2	5 r 1
2	2 r 1
2	1 r 0
	0 r 1

10111_2

$\Rightarrow 10111_2 + 1001_2 = 1000002$

c) 14,5 and 11,5

$$\begin{array}{r} 14{,}5 \\ 11{,}5 \\ \hline 14500 \\ 1450 \\ \hline 725 \\ \hline 166{,}75\,m^2 \end{array}$$

d (i) $(3{,}12\times10^{-3}) + (4{,}5\times10^{-4})$

$10^{-3}\,(3{,}12 + 4{,}5\times10^{-1})$

$10^{-3}(3{,}12 + 0{,}45)$

$10^{-3}(3{,}57)$

$3{,}57 \times 10^{-3}$

OR

$0{,}00312 + 0{,}00045 = 0{,}00357$

$\Rightarrow \quad 3{,}57 \times 10^{-3}$

(ii) $(3{,}12 \times 10^{-3})(4{,}5 \times 10^{-4})$

$3{,}12 \times 4{,}5 \times 10^{-3} \times 10^{-4}$

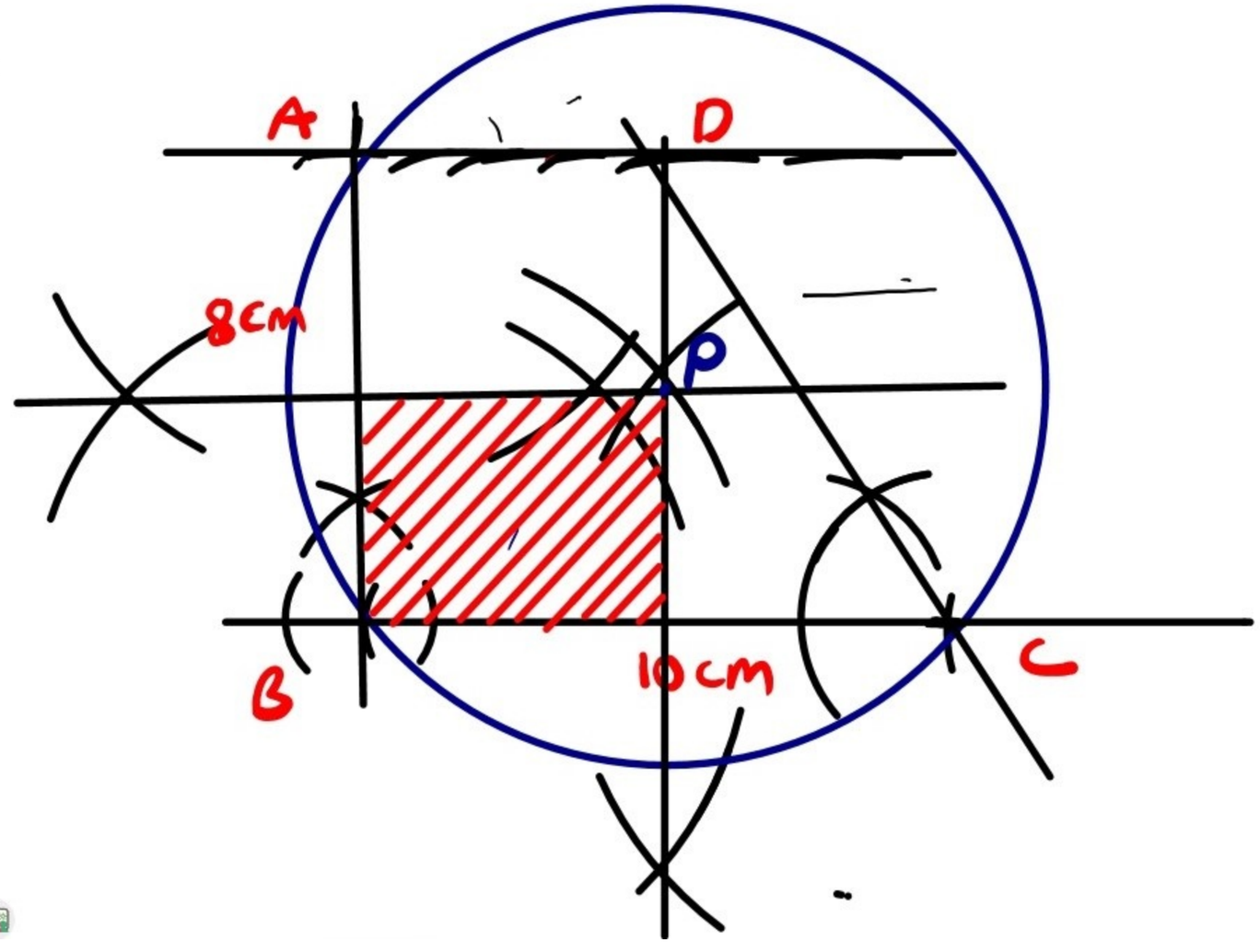
$14{,}04 \times 10^{-3+(-4)}$

$1{,}404 \times 10^{1} \times 10^{-7}$

$1{,}404 \times 10^{-6}$

$$\begin{array}{r} 3{,}12 \\ \times \quad 4{,}5 \\ \hline 12480 \\ 1560 \\ \hline 14{,}040 \end{array}$$

5



7 c) (i) A diameter subtends an angle of 90° at the circumference

OR

An angle in a semi-circle.

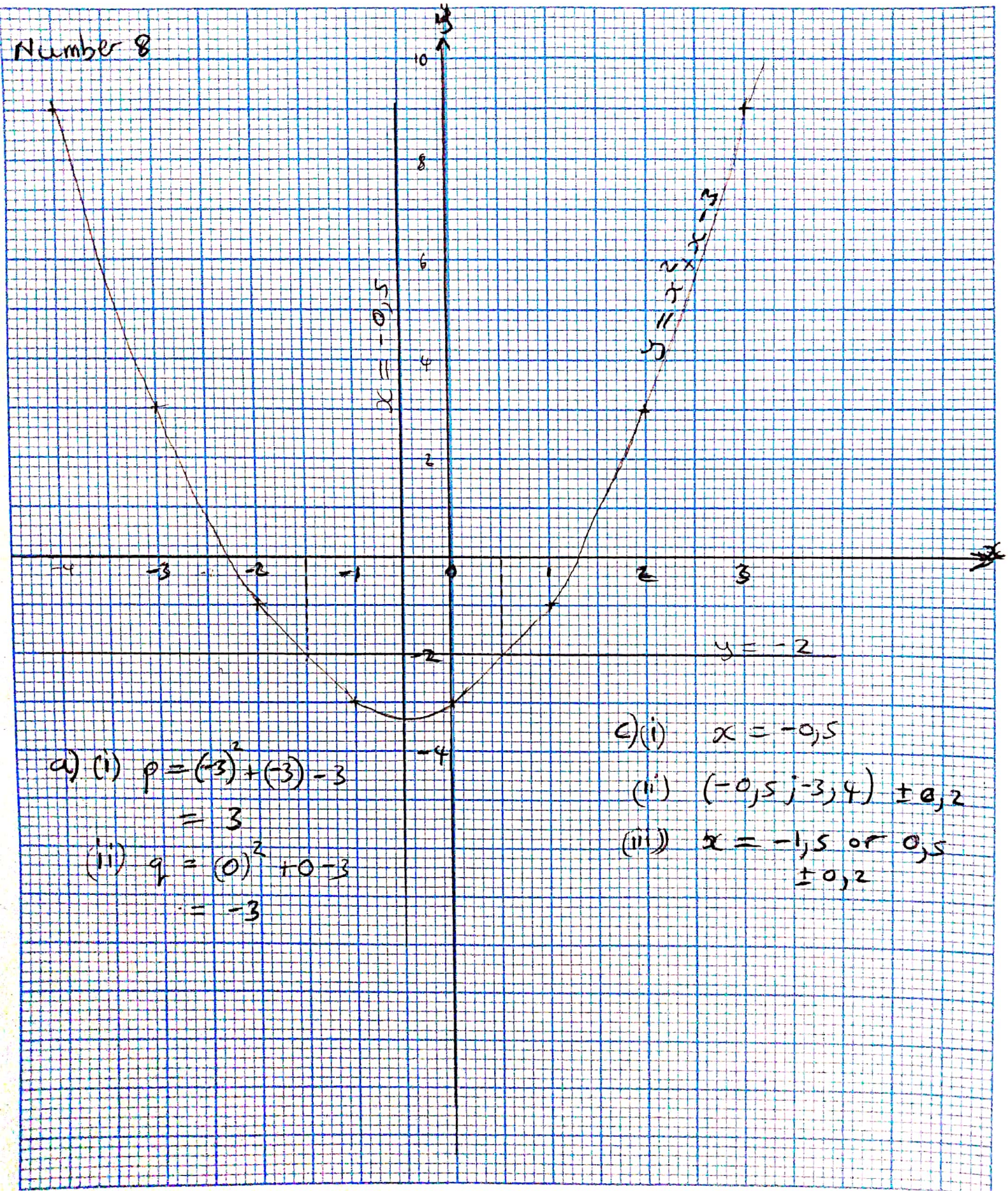
(ii) $Q\hat{S}R = 180 - (90+34)$

$= 56°$

(iii) $S\hat{T}P = 180 - 68$

$= 112°$

Number 8



a) (i) $p = (-3)^2 + (-3) - 3$

$= 3$

(ii) $q = (0)^2 + 0 - 3$

$= -3$

c) (i) $x = -0,5$

(ii) $(-0,5\ ;\ -3,4) \pm 0,2$

(iii) $x = -1,5$ or $0,5$ $\pm 0,2$

9a)

Time in hrs	$0 < t \leq 2$	$2 < t \leq 3$	$3 < t \leq 4$	$4 < t \leq 5$	$5 < t \leq 6$	$6 < t \leq 8$
Frequency	20	25	19	8	3	5

(i) (Please Note Completion of table is still to be verified)

(ii) $\dfrac{(1 \times 20) + (2{,}5 \times 25) + (3{,}5 \times 14) + (4{,}5 \times 8) + (5{,}5 \times 3) + (7 \times 5)}{80}$

$\Rightarrow \dfrac{20 + 62{,}5 + 66{,}5 + 36 + 16{,}5 + 35}{80}$

$\Rightarrow 2{,}96$

$= 3$ (to the nearest hour)

(iii) 2,8 (As read on the graph)

(iv) $\dfrac{6}{80} \times \dfrac{5}{79} = \dfrac{3}{632}$

b) Class width × height = frequency

$$\text{height} = \frac{\text{frequency}}{\text{class width}}$$

$$\text{height (i)} = \frac{2}{21-17} = \frac{2}{4} = 0,5$$

$$\text{height (ii)} = \frac{2}{24-21} = \frac{3}{3} = 1$$

$$\text{height (iii)} = \frac{9}{27-24} = \frac{9}{3} = 3$$

10 a) (i) $\overrightarrow{AS} = \frac{1}{2}\overrightarrow{AB} = \underline{b}$

(ii) $\overrightarrow{OS} = \overrightarrow{OA} + \overrightarrow{AS}$

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

(iii) $\overrightarrow{OR} = \overrightarrow{OC} + \overrightarrow{CR}$

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

(iv) $\overrightarrow{AR} = \overrightarrow{AB} + \overrightarrow{BR} = 2\bar{b} - \bar{a}$

OR

$= \overrightarrow{AO} + \overrightarrow{OC} + \overrightarrow{CR}$

$= -2\bar{a} + 2\bar{b} + \bar{a}$

$= 2\bar{b} - \bar{a}$

b) $\overrightarrow{AT} = h\overrightarrow{AR} = h(2\bar{b} - \bar{a})$

$= 2h\bar{b} - h\bar{a}$

$\overrightarrow{OT} = \overrightarrow{OA} + \overrightarrow{AT} = 2\bar{a} + 2h\bar{b} - h\bar{a}$

$= 2\bar{a} - h\bar{a} + 2h\bar{b}$

$= (2 - h)\bar{a} + 2h\bar{b}$

c) $\overrightarrow{OT} = k\overrightarrow{OS} = k(2\bar{a} + \bar{b})$

$= 2k\bar{a} + k\bar{b}$

d) $2 - h = 2k$ ..... (1)

$2h = k$ ..... (2)

$$2k + h = 2 \quad \times 1$$
$$k - 2h = 0 \quad \times 2$$

$$h = 2 - 2k \quad \cdots (3)$$

substitute

$$k - 2(2 - 2k) = 0$$

$$k - 4 + 4k = 0$$

$$\frac{5k}{5} = \frac{4}{5}$$

$$k = \frac{4}{5}$$

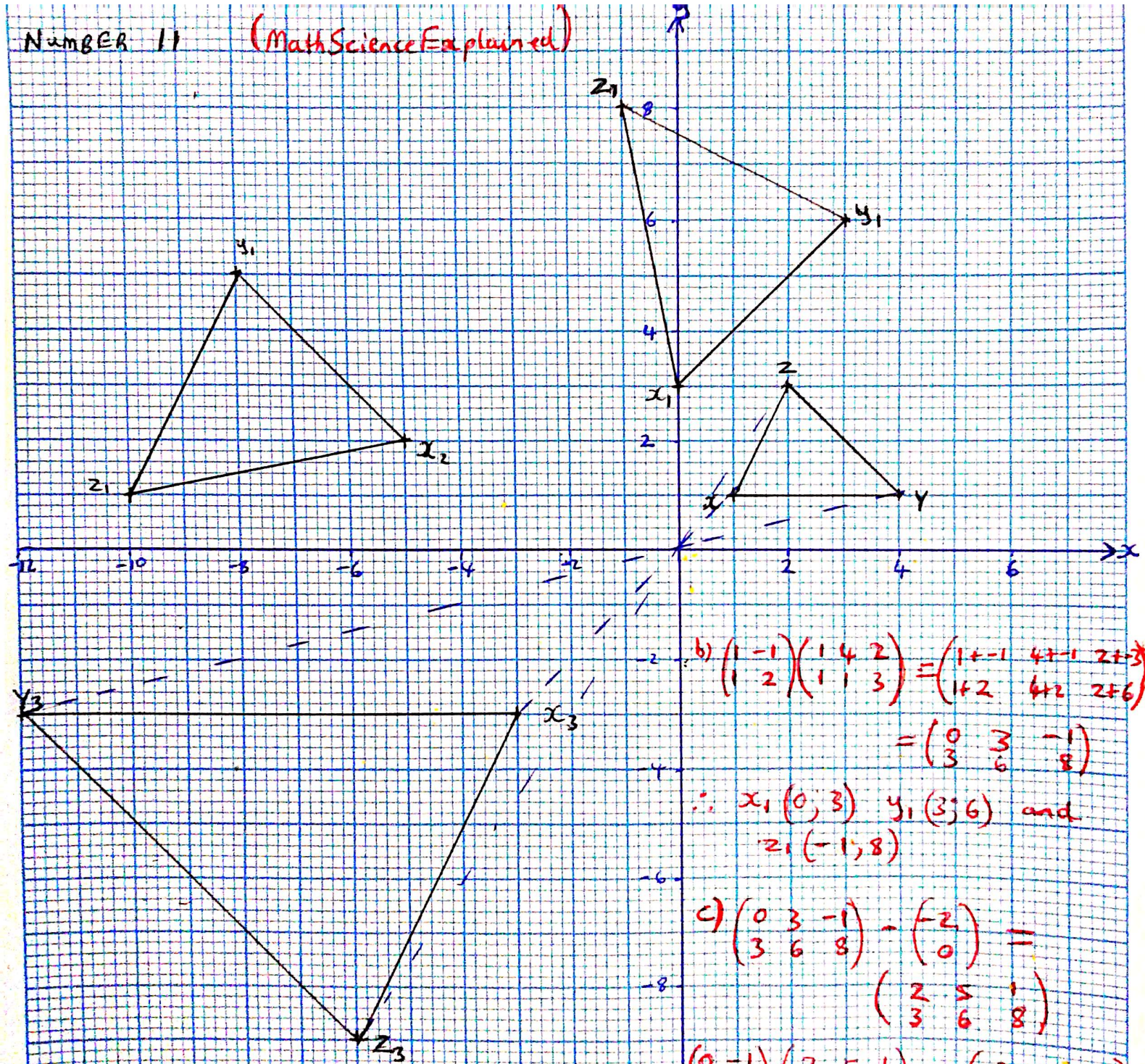
$$h = 2 - 2\left(\frac{4}{5}\right)$$

$$= \frac{2}{5}$$

$\therefore h = \frac{2}{5}$ and $k = \frac{4}{5}$

e) $\frac{TR}{AR} = \frac{3}{5}$

NUMBER 11 (MathScienceExplained)



b) $\begin{pmatrix} 1 & -1 \\ 1 & 2 \end{pmatrix}\begin{pmatrix} 1 & 4 & 2 \\ 1 & 1 & 3 \end{pmatrix} = \begin{pmatrix} 1+-1 & 4+-1 & 2+-3 \\ 1+2 & 4+2 & 2+6 \end{pmatrix}$

$= \begin{pmatrix} 0 & 3 & -1 \\ 3 & 6 & 8 \end{pmatrix}$

$\therefore x_1(0;3)$ $y_1(3;6)$ and $z_1(-1;8)$

c) $\begin{pmatrix} 0 & 3 & -1 \\ 3 & 6 & 8 \end{pmatrix} - \begin{pmatrix} -2 \\ 0 \end{pmatrix} =$

$\begin{pmatrix} 2 & 5 & 1 \\ 3 & 6 & 8 \end{pmatrix}$

$\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}\begin{pmatrix} 2 & 5 & 1 \\ 3 & 6 & 8 \end{pmatrix} = \begin{pmatrix} -3 & -6 & -8 \\ 2 & 5 & 1 \end{pmatrix}$

$\begin{pmatrix} -3 & -6 & -8 \\ 2 & 5 & 1 \end{pmatrix} + \begin{pmatrix} -2 \\ 0 \end{pmatrix}$

$= \begin{pmatrix} -5 & -8 & -10 \\ 2 & 5 & 1 \end{pmatrix}$

$x_2(-5;2)$ $y_2(-8;5)$ $z_2(-10;1)$

e) It is an enlargement
Centre $(0;0)$ or origin
Scale factor -3

f) $\begin{pmatrix} -3 & 0 \\ 0 & -3 \end{pmatrix}$

12 a) $2^5 \times 3^3 \times 5^2 \times 7^3$

b) (i) $30u - 12u - 12u$

$6u$

(ii) $\frac{33}{8} \times \frac{4}{11} \div \frac{20}{3}$

$\frac{33}{8} \times \frac{4}{11} \times \frac{3}{20}$

$\frac{9}{40}$

c) $60 - 12 = 48 \Rightarrow \frac{48}{60} \times 100 \Rightarrow 80\%$

Number 10 (MathScienceExplained)

10 a) (i) $\overrightarrow{AS} = \frac{1}{2}\overrightarrow{AB} = \bar{b}$

(ii) $\overrightarrow{OS} = \overrightarrow{OA} + \overrightarrow{AB}$

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

(iii) $\overrightarrow{OR} = \overrightarrow{OC} + \overrightarrow{CR}$

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

(iv) $\overrightarrow{AR} = \overrightarrow{AB} + \overrightarrow{BR}$

$= 2\bar{b} - \bar{a}$

OR

$\overrightarrow{AR} = \overrightarrow{AO} + \overrightarrow{OC} + \overrightarrow{CR}$

$= -2\bar{a} + 2\bar{b} + \bar{a}$

$= 2\bar{b} - \bar{a}$

b) $\overrightarrow{AT} = h\overrightarrow{AR} = h(2\bar{b} - \bar{a})$

$= 2h\bar{b} - h\bar{a}$

$\overrightarrow{OT} = \overrightarrow{OA} + \overrightarrow{AT} = 2\bar{a} + 2h\bar{b} - h\bar{a}$

$= 2\bar{a} - h\bar{a} + 2h\bar{b}$

$= (2-h)\bar{a} + 2h\bar{b}$

c) $\overrightarrow{OT} = k\overrightarrow{OS} = k(2\bar{a} + \bar{b})$

$= 2k\bar{a} + k\bar{b}$

d) $2 - h = 2k$ ---(1)

$2h = k$ ---(2)

$h = 2 - 2k$ ----(3)

Substitute

$k - 2(2 - 2k) = 0$

$k - 4 + 4k = 0$

$\frac{5k}{5} = \frac{4}{5}$

$$K = \frac{4}{5}$$

$$h = 2 - 2\left(\frac{4}{5}\right)$$

$$= \frac{2}{5}$$

$$\therefore h = \frac{2}{5} \quad \text{and} \quad k = \frac{4}{5}$$

e) $$\frac{TR}{AR} = \frac{3}{5}$$