

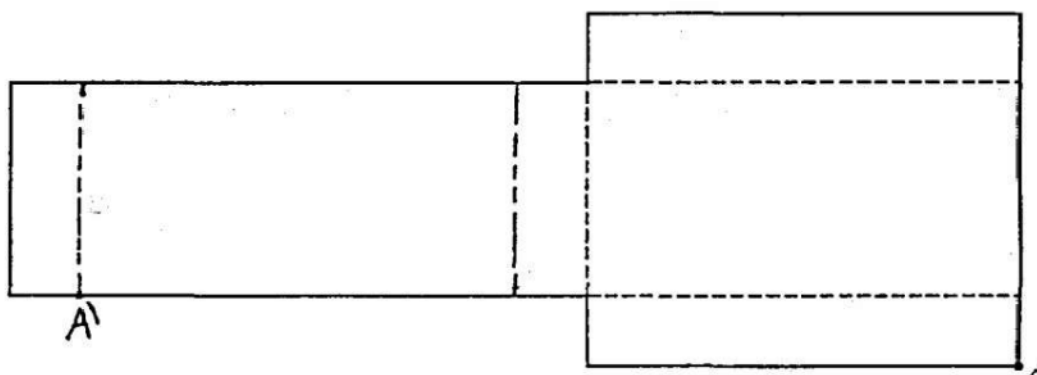
June 1997

Paper 2

1. New temperature = $-34.8 + 81.9 = 47.1^\circ$ Answer 47.1°C

2. Using calculator 8.347 Answer 8.347

3.



4. (a) $25 - \frac{1}{2} \times 5 = 22.5 \text{ m} \leq \text{length of the wall} < 25 + \frac{1}{2} \times 5 = 27.5 \text{ m}.$

(b) $2 - \frac{1}{2} \times 0.1 = 1.95 \text{ m} \leq \text{height of the wall} < 2 + \frac{1}{2} \times 0.1 = 2.05 \text{ m}.$

5. $\frac{82}{99}$, 82%, $\sqrt{0.674}$
 0.828282 0.82 0.82097

(a) Answer (a) 82% $< \sqrt{0.674} < \frac{82}{99}$

(b) Answer (b) 0.0083 .

$$\begin{aligned}
 6. \quad & 3x + 4y = 3 \\
 & x + 6y = 8 \quad (x - 3) \\
 & 3x + 4y = 3 \\
 & \underline{-3x - 18y = -24} \\
 & \quad -14y = -21 \\
 & y = 1.5 \\
 & x + 6 \times 1.5 = 8 \\
 & x + 9 = 8 \Rightarrow x = -1
 \end{aligned}$$

$$\begin{aligned}
 \text{Answer } x &= -1 \\
 y &= 1.5
 \end{aligned}$$

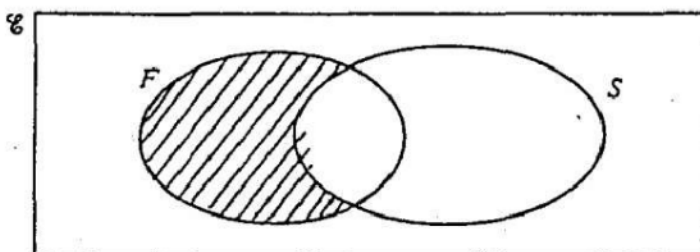
$$7. \text{ (a) } 135\,000 \text{ miles per hour} = \frac{135000 \times 1580}{60 \times 60} = 59250$$

$$\text{Answer (a) } 59250 \text{ m/s}$$

(b)

$$\text{Answer (b) } 5.925 \times 10^4 \text{ m/s}$$

8. (a)



$$(b) \text{ (i) } 30 - 5 = 25$$

$$\text{Answer (b) (i) } 25$$

$$(ii) 10 + 18 - 25 = 3 \text{ study both.}$$

$$\text{Number study French but not Spanish} = 10 - 3 = 7$$

$$\text{Answer (b) (ii) } 7$$

$$\begin{aligned}
 9. \text{ (a) } 10000 \text{ francs} &= \frac{10000}{5.05} = 1980.2 \text{ \$} \\
 \text{dollars spent} &= 1980 - 190 = 1790
 \end{aligned}$$

$$\text{Answer (a) } \$ 1790.$$

$$(b) \text{ rate} = \frac{1000}{190} = 5.26$$

$$\$ 1 = 5.26 \text{ francs}$$

$$\text{Answer (b) } \$ 1 = 5.26 \text{ francs}$$

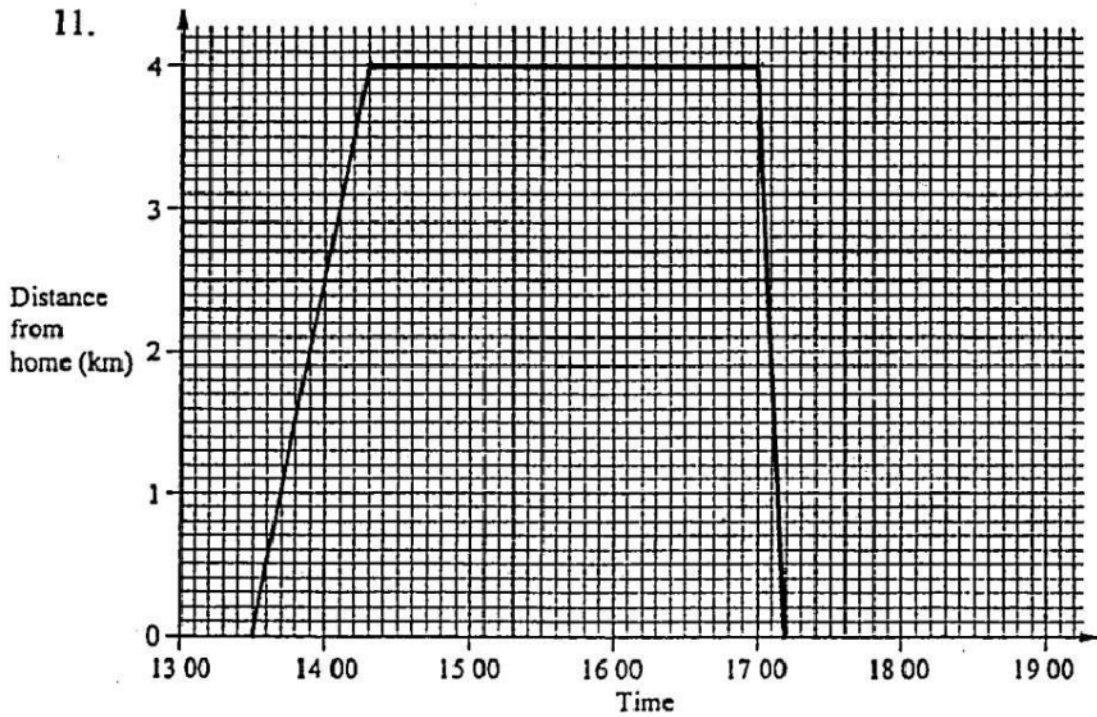
$$10. \quad T = 3 + \frac{5}{v}$$

$$T - 3 = \frac{5}{v}$$

$$v(T - 3) = 5$$

$$v = \frac{5}{T - 3}$$

$$\text{Answer } V = \frac{5}{T - 3}$$



$$(a) \quad \frac{4}{20} = \frac{1}{5} \text{ h} = 12 \text{ min.}$$

time of arrival 17 12.

$$(b) \quad 14 18 - 13 30 = 0 48 \text{ min} = 0.8 \text{ h.}$$

$$\text{walking speed} = \frac{4}{0.8} = 5 \text{ km/h.}$$

Answer (b) 5 km/h.

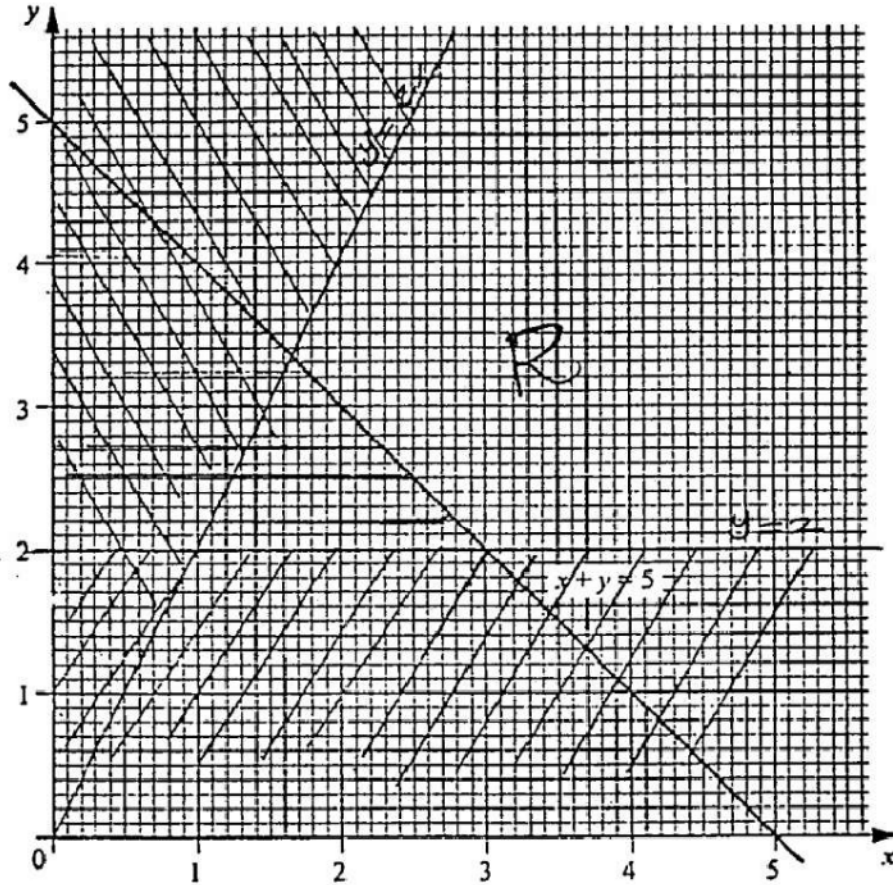
$$12. \quad \cos 35^\circ = \frac{GA}{GP}$$

$$\cos 35^\circ = \frac{21.3}{GP}$$

$$GP = 26$$

Answer $GP = 26$

13.



$$14. (a) \quad \begin{array}{l} 5 : 4 \\ ? : 48 \end{array}$$

$$\text{New length} = 48 \times \frac{5}{4} = 60 \text{ cm}$$

$$\begin{array}{l} 3 : 4 \\ 36 \end{array}$$

$$\text{New width} = \frac{36 \times 3}{4} = 27 \text{ cm}$$

Answer (a) length = 60 cm.
width = 27 cm.

$$(b) \frac{\text{new area}}{\text{old area}} = \frac{60 \times 27}{48 \times 36} = \frac{45}{48} = \frac{15}{16}$$

15.(a)	original	reduction	sale price
	100	20	80
	488		?

$$\text{Sale price} = \frac{488 \times 80}{100} = 390.4$$

	original	reduction	sale price
	1	$\frac{1}{3}$	$\frac{2}{3}$
	579		?

$$\text{Sale price} = 579 \times \frac{2}{3} = 386$$

Answer (a) \$ 390.4
\$ 386

(b)	Cost price	Profit	Selling price
	100	52.5	152.5
	?		488

$$\text{Cost price} = 320$$

Answer (b) \$ 320

$$16. w = \frac{180 - 68}{2} = \frac{112}{2} = 56^\circ$$

Answer $w = 56^\circ$

$$x = B = 68^\circ$$

$$x = 68^\circ$$

$$y = 90 - x = 90 - 68 = 22^\circ$$

$$y = 22^\circ$$

$$z = 180 - 2 \times 68 = 44^\circ$$

$$z = 44^\circ$$

$$\text{Since } \angle TAD = \angle TAD = 68^\circ$$

$$17. (a) (i) g(2) = 9 - 2 \times 2 = 5$$

$$(ii) fg(2) = f(5) = 5 \times 5 + 1 = 26$$

$$(b) gf(x) = 9 - 2(5x + 1) = 9 - 10x - 2 = 7 - 10x$$

$$18. (a) \text{ Each exterior angle} = \frac{360}{10} = 36^\circ$$

$$\text{Each interior angle} = 180 - 36 = 144^\circ$$

$$(b) \quad \text{all interior angles} = (2 \times 10 - 4) \times 90 = 1440$$

Less 7 angles each 156°

$$1440 - 156 \times 7 = 348$$

$$3 : 4 : 5 \quad \text{total } 12$$

$$\text{smallest angle} = \frac{3}{12} \times 348 = 87^\circ$$

$$19. (a) \quad AB = \sqrt{[3 - (-4)]^2 + (2 - 26)^2} = \sqrt{7^2 + 24^2} = 25$$

Answer (a) $AB = 25$

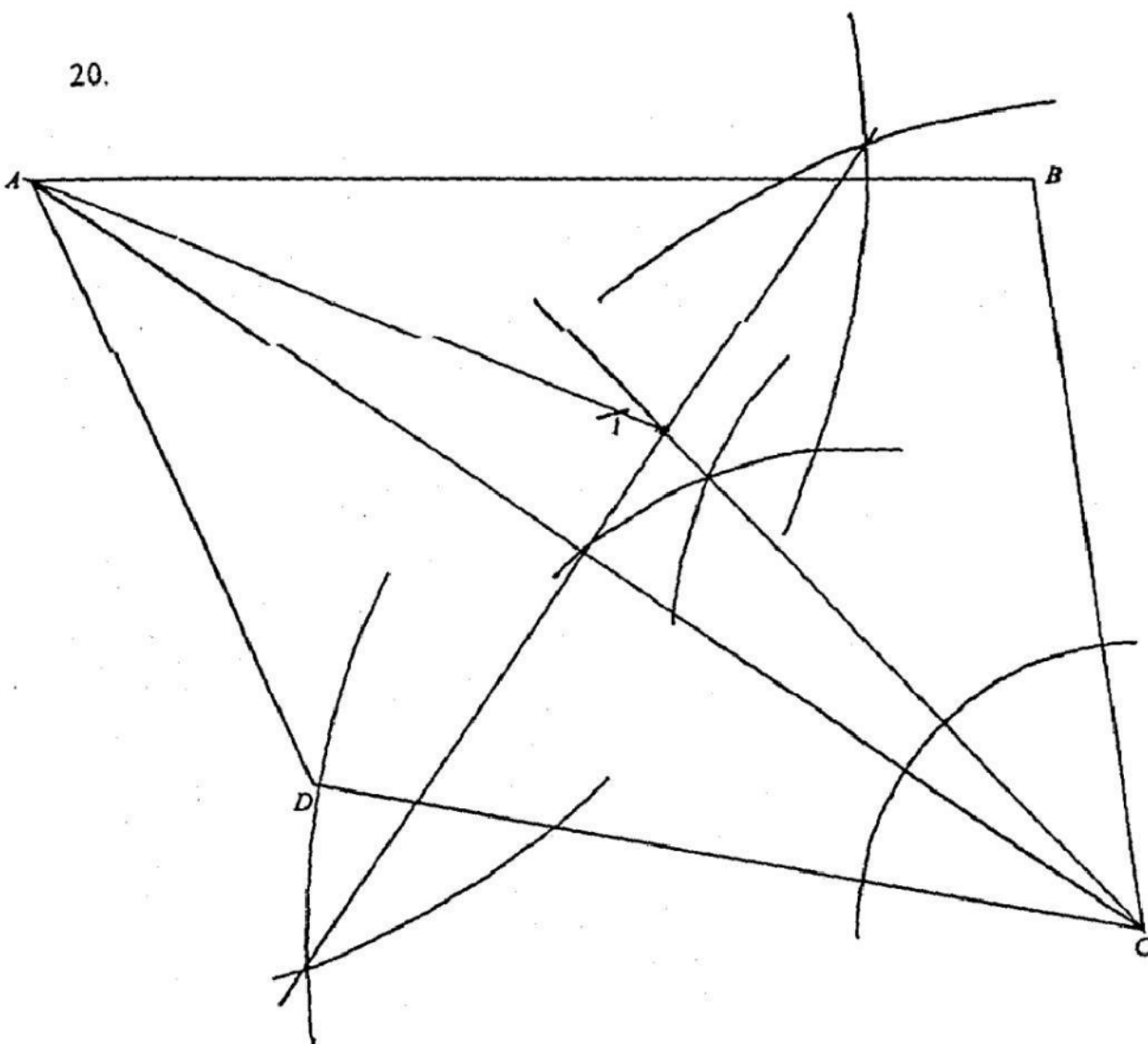
$$(b) \quad \text{Vectors } \vec{OA} = \begin{pmatrix} 3 \\ 2 \end{pmatrix} \quad \text{vector } \vec{OB} = \begin{pmatrix} -4 \\ 26 \end{pmatrix}$$

$$\text{vector } AB = \vec{OB} - \vec{OA} = \begin{pmatrix} -7 \\ 24 \end{pmatrix}$$

$$\begin{aligned} \vec{AC} &= \vec{AB} + \vec{BC} \\ &= \begin{pmatrix} -7 \\ 24 \end{pmatrix} + \begin{pmatrix} 1 \\ -20 \end{pmatrix} = \begin{pmatrix} -6 \\ 4 \end{pmatrix} \end{aligned}$$

$$\text{Answer (b) } \vec{AC} = \begin{pmatrix} -6 \\ 4 \end{pmatrix}$$

20.



Scale: 1 centimetre represents 2 metres

$$\text{Distance TA} = 10.6 \times 2 = 21.2 \text{ m}$$

$$21. \text{ (a) } \sin 34^\circ = \frac{CB}{20}$$

$$CB = 20 \times \sin 34^\circ$$

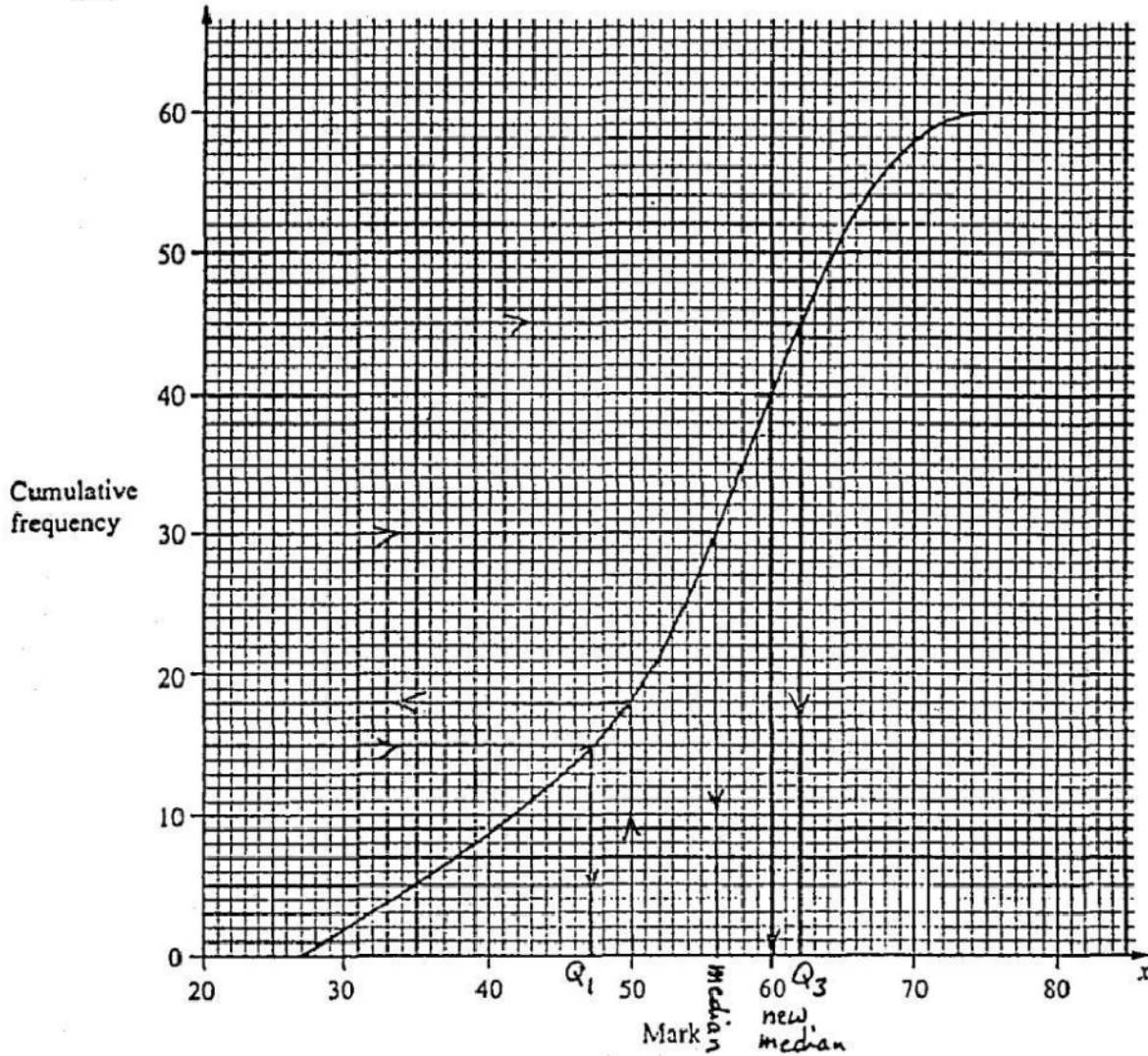
$$= 11.2 \text{ cm.}$$

$$\text{(b) } \angle COB = 2 \times 34 = 68^\circ$$

angle COB is twice angle CAB.

$$\text{(c) Length of arc} = \frac{68}{360} \times 2 \times 3.142 \times 10 = 11.9 \text{ cm.}$$

22.



(a) (i) 56

(ii) 62

The lower quartile = 47

(iii) $62 - 47 = 15$

(b) (i) 60

(ii) Number of candidates scoring less than 50 = 18

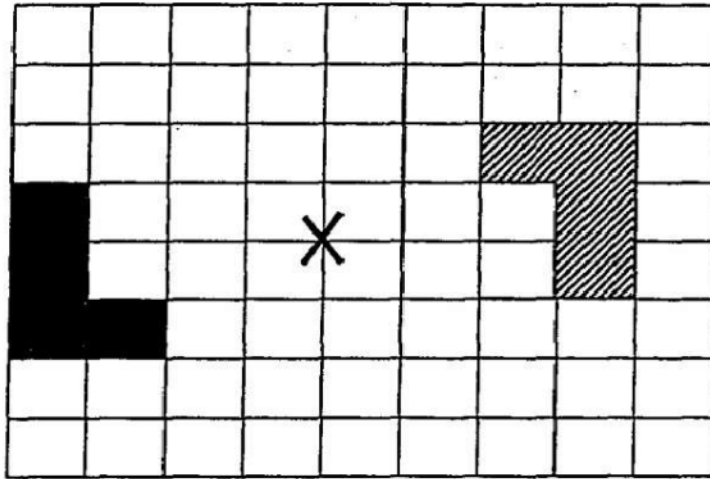
Percentage failed = $\frac{18}{80} \times 100 = 22.5\%$

1- $A = \{2,3,5,7,11,13,17,19\}$

$B = \{3,5,7,9,11,13,15,17,19\}$

Answer: $A \cap B = \{3,5,7,11,13,17,19\}$

2-



3- (a) $15 - (-1) = 16$

Answer (a) 16 C°

(b) The temperature decreased and then increased.

4- $X > 4$ $\frac{4}{X}$ is less than one (and positive i.e. > 0)

$\frac{X}{4}$ is more than one

$4 - X$ is negative.

Answer: $4 - X < \frac{4}{X} < \frac{X}{4}$

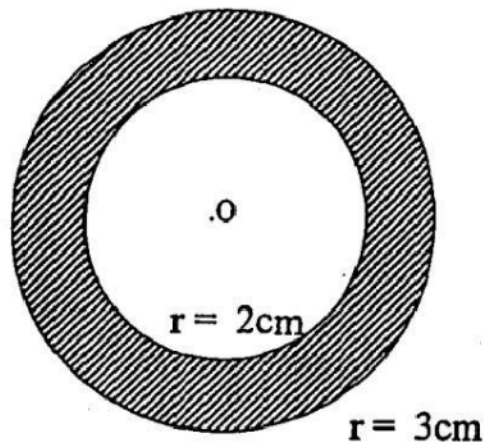
5- 5.5 $d < 6.5$

$r = \frac{d}{2}$

$\therefore \frac{5.5}{2} \leq r < \frac{6.5}{2}$

Answer: 2.75 $r < 3.25$

6-



7- Amount received $= \frac{2000}{81.50} = 24.54$

Answer \$ 24.54

8- (a) $0.0013 = 1.3 \times 10^{-3}$

(b) $1.3 \times 10^{-3} \times 100 \times 100 \times 100 = 1.3 \times 10^3 = 1300$

Answer: $1300 \text{ g} \cdot \text{m}^3$

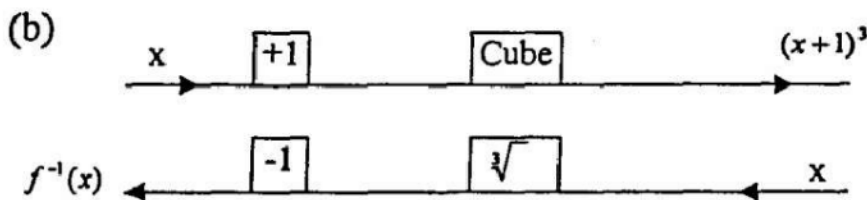
9- (a) $2x^2 \times 3x^3 = 6x^{2+3} = 6x^5$

Answer: (a) $6x^5$

(b) $a^{\frac{5}{6}} + a^{\frac{1}{2}} = a^{\frac{5}{6} + \frac{1}{2}} = a^{\frac{1}{3}}$

Answer: (b) $a^{\frac{1}{3}}$

10- (a) $f(-3) = (-3+1)^3 = (-2)^3 = -8$

Answer: (a) $f(-3) = -8$ Answer: (b) $f^{-1}(x) = \sqrt[3]{x} - 1$

11- (a) $\angle ACD = 25$ alternate angles.

(b) $\angle ABC = 90 - 25 = 65^\circ$
(since $\angle C = 90^\circ$)

(c) $\angle ABD = \angle ACD = 25$ same arc
Bearing of D from B is 025°
 \therefore Bearing of B from D = $180 + 25 = 205^\circ$

12- (a) $\tan A = \frac{5}{12}$

$$(b) \frac{2 \tan A}{(1 - \tan A)(1 + \tan A)} = \frac{2 \tan A}{1 - (\tan A)^2} = \frac{2 \times \frac{5}{12}}{1 - \left(\frac{5}{12}\right)^2} = \frac{\frac{10}{12}}{1 - \frac{25}{144}} = \frac{\frac{10}{12}}{\frac{119}{144}} = \frac{10}{12} \times \frac{144}{119} = \frac{120}{119}$$

Answer: (b) $\frac{120}{119}$

13- Similar figures

$$\frac{A_1}{A_2} = \left(\frac{l_1}{l_2}\right)^2$$

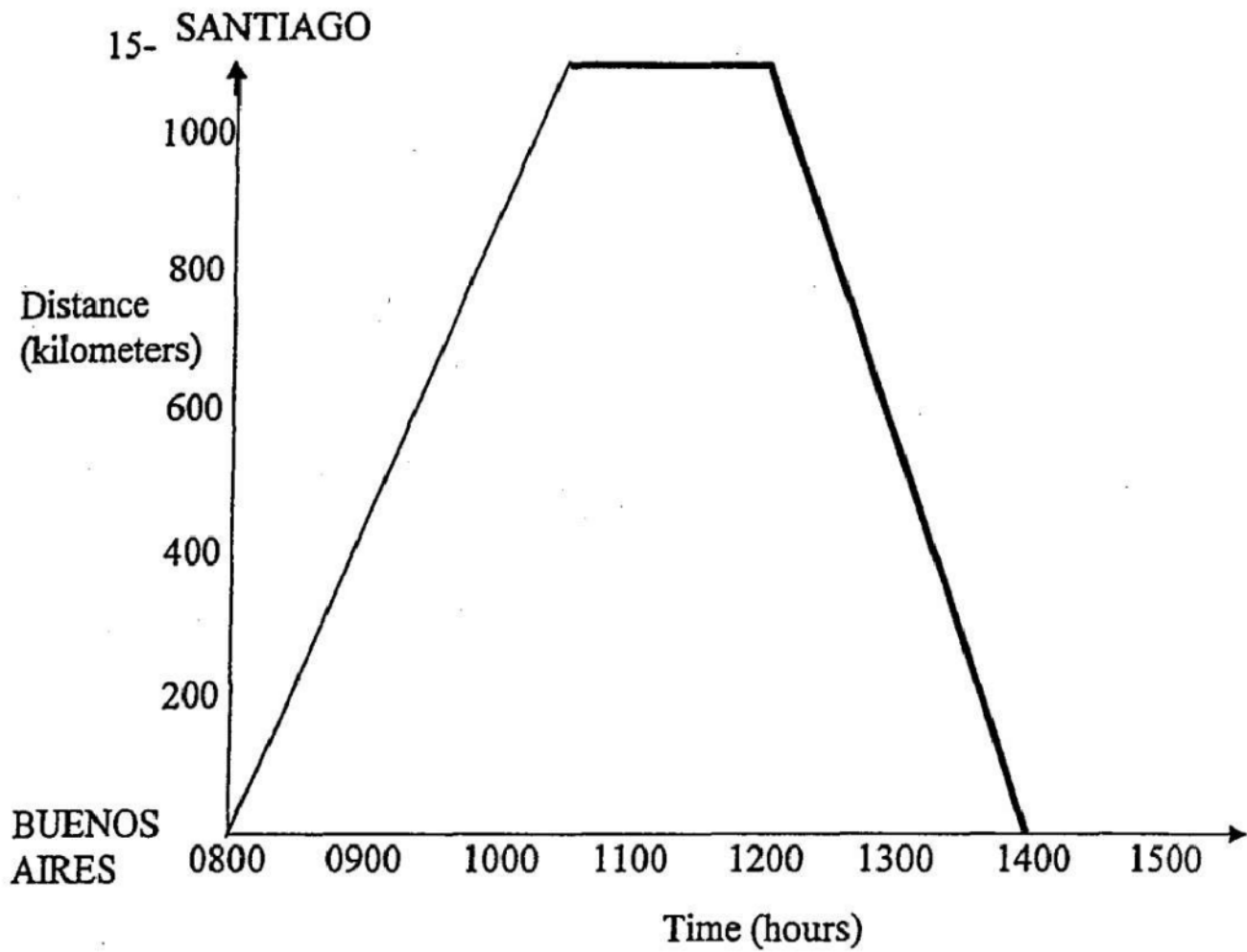
$$\left(\frac{1}{4}\right) = \left(\frac{80}{120}\right)^2$$

$$A_2 = \frac{\frac{1}{4}}{\left(\frac{80}{120}\right)^2} = \frac{1}{4} \times \left(\frac{120}{80}\right)^2 = \frac{1}{4} \times \frac{9}{4} = \frac{9}{16}$$

Answer: $\frac{9}{16} m^3$

14-(a) $x^2 - 7x + 10 = (x-2)(x-5)$

(b) $3ax - 6x - ay + 2y = 3x(a-2) - y(a-2) = (a-2)(3x-y)$



(a) Average speed = $\frac{\text{distance}}{\text{time}}$

Distance = 1100 km Time = 1030 - 0800 = 230 = $2\frac{1}{2}h$

Average speed = $\frac{1100}{2\frac{1}{2}} = 440 \text{ km / h}$

(b) time = $\frac{1100}{550} = 2h$

$$16- (a) \cos 50 = \frac{AB}{100}$$

$$\begin{aligned} AB &= 100 \cos 50 \\ &= 64.279 \approx 64.3 \text{ m} \end{aligned}$$

$$(b) \sin 65^\circ = \frac{BE}{AB}$$

$$BE = AB \sin 65 = 58.3 \text{ m}$$

$$17- \frac{x}{x+2} - \frac{x-2}{x} = \frac{x^2 - (x+2)(x-2)}{x(x+2)} = \frac{x^2 - (x^2 - 4)}{x(x+2)} = \frac{4}{x(x+2)}$$

$$18- (a) \cos \angle ROT = \frac{20^2 + 20^2 - 32^2}{2 \times 20 \times 20} = \frac{400 + 400 - 1024}{800} = \frac{-224}{800}$$

$$\therefore \angle ROT = 106.26^\circ$$

$$(b) \text{ Length of arc RST} = \frac{\theta}{360} \times 2\pi r = \frac{106.26}{360} \times 2 \times \pi \times 20 = 37.1$$

Answer (b) Arc RST = 37.1 cm

$$19- (a) A = 800 \left(1 + \frac{6}{100}\right)^5 = 800 \times (1.06)^5 = 1070.58$$

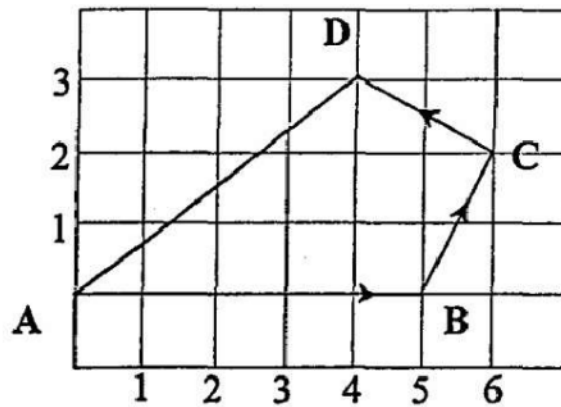
$$(b) A = p \left(1 + \frac{r}{100}\right)$$

$$\frac{A}{p} = 1 + \frac{r}{100}$$

$$\frac{r}{100} = \frac{A}{p} - 1 = \left(\frac{A - p}{p}\right)$$

$$r = \frac{100 (A - p)}{p}$$

22- (a)



(b) $|\overline{BC}| = \sqrt{1^2 + 2^2} = \sqrt{5} = 2.24$

- (c) From A draw an arc of radius 5 (length of AB) and from C draw an arc of radius equal length of CB
The point of intersection is D
D is the point (4,3)

Answer (c) $\overline{AD} = \begin{pmatrix} 4 \\ 3 \end{pmatrix}$

$$\overline{DC} = \begin{pmatrix} 2 \\ -1 \end{pmatrix}$$