(ii)

$\angle RTS = 30^0$ *and* $\angle RPS = 50^0$

$\therefore \angle USP = 30^0 + 50^0 = 80^0$

(iii) $\angle PQR = 180^0 - 50^0 = 130^0$

(b) (i)

$PT \times TR = TS^2$

$(7 + x)(7) = 9^2$

$7x = 81 - 49 = 32$

$x = \frac{32}{7} = 4.57$

(ii)

$\angle ORP = 40^0$

$\cos 40^0 = \frac{\frac{1}{2} \times 4.57}{r}$

$r = \frac{\frac{1}{2} \times 4.57}{Cos\ 40} = 2.98$

(10 marks)

30.3.3 Mathematics Alt. B Paper 1 (122/1)

1. $270 \div (90 \times 2) + 7 \times 4 - 40 \div 5$

$= 270 \div 180 + 28 - 8$

$= 21\frac{1}{2}$ 2 marks

2. $7056 = 2^4 \times 3^2 \times 7^2$

$\sqrt{7056} = 2^2 \times 3 \times 7$

$= 84$ 2 marks

3. $\frac{2(^-2) + 3(3 + 5)}{4 \times 3 \times 5}$

$= \frac{^-4 + 24}{60}$

$= \frac{1}{3}$ 2 marks

4. Width of floor $= \sqrt{37.7^2 - 35.2^2}$

$\therefore$ area of floor $= \sqrt{37.7^2 - 35.2} \times 35.2$

$= 475.2\ m^2$ 3 marks

5.

NO.	LOG	
43.2		1.6355
0.015		+
		$\bar{2}.1861$
		$\bar{1}.8116$
		-
$\sqrt[3]{0.00679}$	$\bar{3}.8319 \div 3$	$\bar{1}.2773$
3.422		0.5343

6. $\angle CBG = 180^0 - 120^0 = 60^0$

$\angle ECB = 90^0$

$\angle BGC = 30^0$ 3 marks

7. $$\frac{3\frac{1}{3} + \frac{6}{7} \times \frac{49}{9}}{\frac{44-35}{10}}$$

$$= \frac{8}{\frac{9}{10}}$$

$$= \frac{8 \times 10}{9} = 8\frac{8}{9}$$ 3 marks

8. Volume of water in m^3

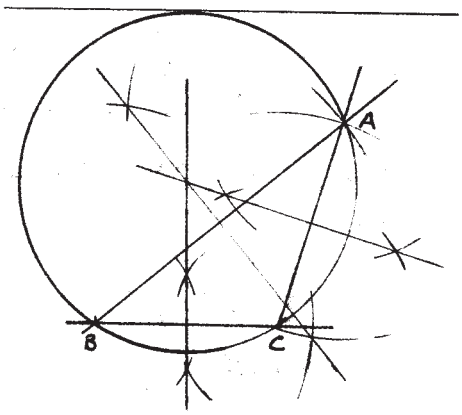
$$= \frac{21000}{100} = 21\ m^3$$

Height of water

$$= \frac{21}{4 \times 3.5} = 1.5\ m$$

3 marks

9.



Construction of ΔABC
Construction of $\perp$ as bisectors
Construction of circle

3 marks

10. $3x - 2 < 10 + x \leq 2 + 5x$
$3x - 2 < 10 + x$
$2x < 12$
$x < 6$

$10 + x \leq 2 + 5x$
$-4x < -8$
$-x < -2$
$x \geq 2$

$\therefore 2 \leq x < 6$

3 marks

11. Length of $\perp a$, $h = 12 \sin 36^0$
$= 7.05$

$\therefore$ area of trapezium

$$= \frac{20+8}{2} \times 7.05$$

$$= 98.75 \text{ cm}^3$$

4 marks

12. Ratio of increase: 1200:800
= 3:2

Original price for a pair of trousers

$$\frac{t}{2700} = \frac{2}{3}$$

$$t = \frac{2}{3} \times 2700 = 1800$$

3 marks

13. Shaded area

$= \frac{150}{360} \times \pi \times 10.5^2 - \frac{1}{2} \times 10.5^2 \sin 150^0$

$= 144.3169125 - 27.5625$

$= 116.7544125 \approx 116.8 cm^2$

4 marks

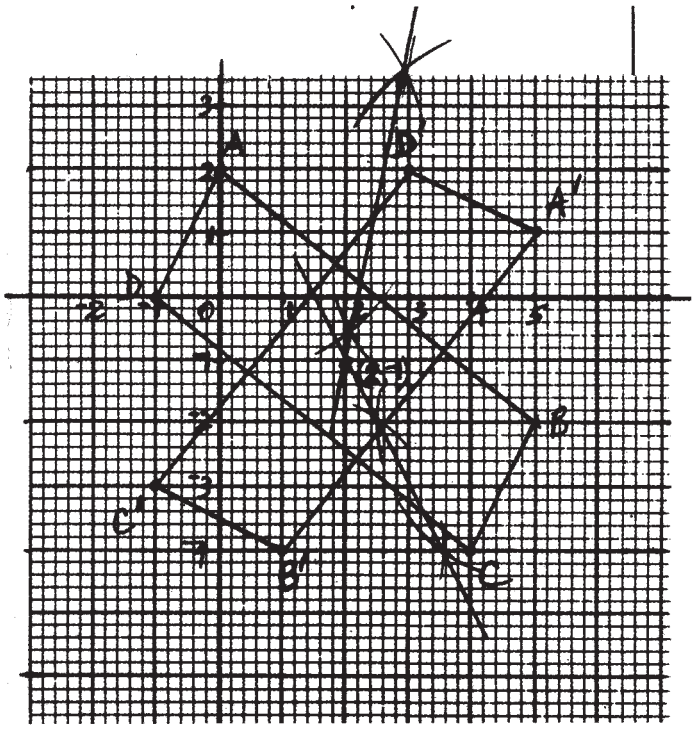
14. $25 = 5^2$; $30 = 2 \times 3 \times 5$; $35 = 5 \times 7$

LCM = $2 \times 3 \times 5^2 \times 7$

Time = $\frac{1050}{60} = 17.5h$

4 marks

15.



a) Construction of at least 2 mediators
Centre of rotation (2,-1)

b) Angle of rotation -90^0

3 marks

16. Commission earned

$\frac{2}{100} \times 30000 + \frac{3.5}{100} \times (84000 - 30000)$

$= 600 + 1890 = 2490$

Total earnings

12000 + 2490 = 14490

4 marks

17. a) 2400 x 120

= 288000

b) Amount left
288000 – 13500
In Tsh. = 153000 x 16.5
= 2524500
Amount in Tsh spent

$$\frac{40}{100} \times 2524500 = 1009800$$

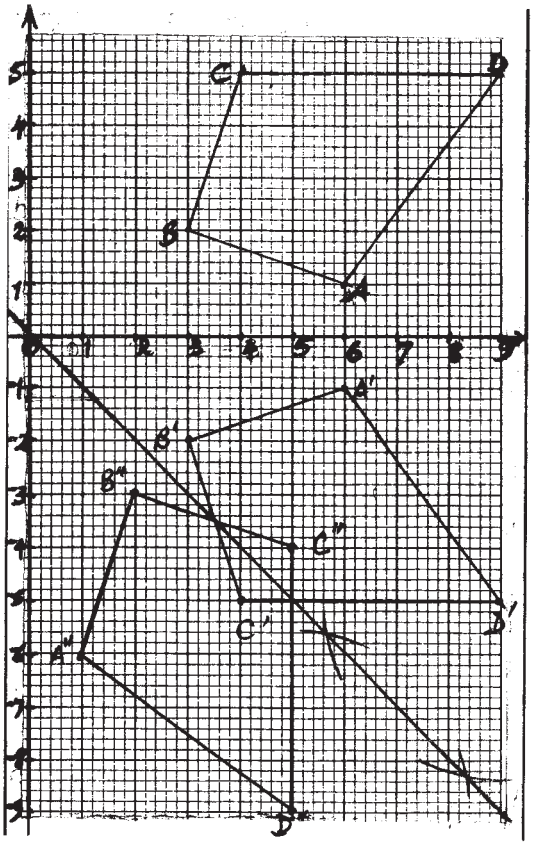
c) Remaining amount in £

$$= \frac{60}{100} \times \frac{153000 \times 16.5}{1980}$$

= £ 765

10 marks

18.



a) Drawing image A'B'C'D'

b) (i) image A"B"C"D"
(ii) mediator(s)

c) (i) equation of line

Gradient $\frac{^{-}5 - {}^{-}3.5}{5 - 3.5} = {}^{-}1$

$\therefore$ equation $y = {}^{-}x$

(ii) I(1,0) → I'(0,-1); J(0,1) → J'(-1,0

∴ matrix of reflection in

$y = -x$ is $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$

10 marks

19. a)

$(7x+5)(x+10)$

$= 7x^2+70x+5x+50$

$= 7x^2+75x+50$

b)

$7x^2+75x+50=600$

$7x^2-35x+110x-550=0$

$(7x+110)(x-5=0)$

$x=5$

∴ *perimeter*

$=2(7\times5+5)+2(5+10)$

$=80+30=110m$

c) $\frac{110}{5} = 22$

10 marks

20. a) Cross sectional area

$=\pi\times(0.3^2-0.26^2)$

$= 0.070371675 \approx 0.07$

b) (i) External surface area

$\pi\times2\times0.3\times6.5+2\times0.07$

$= 12.25221135+0.14$

$= 12.39$

(ii) Internal surface area

$= \pi\times2\times0.26\times6.5$

$= 10.61858317 \approx 10.62$

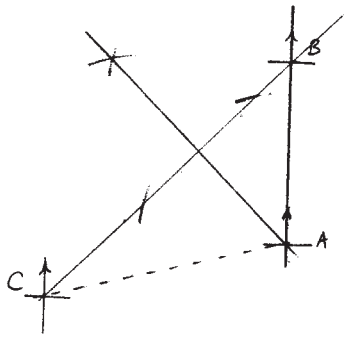
(iii) Total surface area

$12.39+10.62$

$= 23.01m^2$

10 marks

21.



a) Location of B
Location of C

b) Distance of A from C
5.5
5.5 x 100 = 550 km

Bearing of A from C = 255^0

c) Shortest distance of A from BC
Drawing ⊥ ar
Measuring 2.8 cm
Actual distance = 2.8 x 100 = **280 km**

10 marks

22. a) $64\ m^3 = 64 \times 1000000$
$= 64000000\ cm^3$

b) v.s.f. $= \frac{64000000}{512} = 125000$

d.s.f. $\sqrt[3]{12500} = 50$

A.s.f. $= 50^2 = 2500$

c) Amount of paint required
= 2500 x 0.004 = 10

Cost = 10 x 120 = 1200

10 marks

23. a) distance travelled:

$$\frac{1}{2} \times 10 \times 20 = 100\,m$$

b) average velocity:

distance: 10 x 25 + ½ x 25 x 20
= 250 + 250 = 500

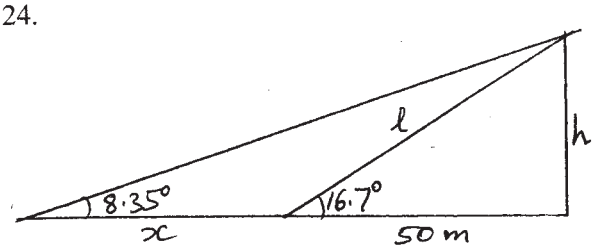
$\therefore$ velocity $\quad \frac{500}{45-20} = 20$ m/s

c) acceleration: $\frac{0-30}{60-45}$ 4

4 4 4 4 $= \frac{-30}{15} = {}^{-}2m/s^2$

10 marks

24.



a) (i) $\frac{h}{50} = \tan 16.7^0$

$h = 50\tan 16.7^0 = 15.00071889$

$= 15.00m$

(ii) $\frac{50}{l} = \cos 16.7$

$l = \frac{5}{\cos 16.7} = 52.20173912$

$= 52.20\,m$

b) $\frac{15}{50+x} = \tan 8.35$

$50+x = \frac{15}{\tan 8.35}$

$50 + x = 102.1968412$

$x = 102.1968412 - 50$

$= 52.20$ m

10 marks

1. $\dfrac{(0.52)^3 \times \sqrt{4.17}}{3.58911} = 0.08000239$

$= 0.080000$

2 marks

2. a) $R = \begin{pmatrix} P & \\ 2 & 4 \\ -3 & -7 \end{pmatrix} - \begin{pmatrix} 2Q & \\ -2 & 4 \\ 0 & -6 \end{pmatrix}$

$= \begin{pmatrix} 4 & 0 \\ -3 & -1 \end{pmatrix}$

b) $\begin{pmatrix} 2 & 4 \\ -4 & -7 \end{pmatrix}\begin{pmatrix} 4 & 0 \\ -3 & -1 \end{pmatrix}$

$= \begin{pmatrix} -4 & -4 \\ 9 & 7 \end{pmatrix}$

4 marks

3. $2x^2 - 3x - 5 = 0$
$2x^2 - 5x + 2x - 5 = 0$
$x(2x - 5) + 1(2x - 5) = 0$
$(2x - 5)(x + 1) = 0$

Either $2x - 5 = 0 \Rightarrow x = 2\frac{1}{2}$
Or $x + 1 = 0 \Rightarrow x = -1$

3 marks

4. $B = \sqrt{\dfrac{EN}{N+P}} \Rightarrow B^2 = \dfrac{EN}{N+P}$

$B^2N + B^2P = N$

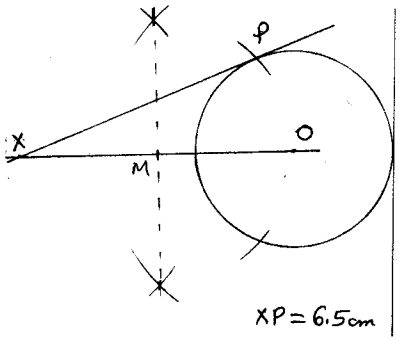
$B^2N - EN = B^2P$

$N(B^2 - E) = -B^2P$

$N = \dfrac{-B^2P}{B^2 - E} = \dfrac{B^2P}{E - B^2}$

3 marks

5.



6. $AB = 4q - 6q + 2p - 14q$

$= \quad -4p - 10q$

$-4p - 10q = -2(2p + 5q) = m(2p + 5q)$

$\therefore \quad m = -2$

4 marks

7. a) $\frac{1}{5} - \frac{1}{8} = \frac{8-5}{40}$

$= \quad \frac{3}{40}$

b) $\frac{40}{3} = 13\frac{1}{3}$ hours

3 marks

8. a) Angle representing maize

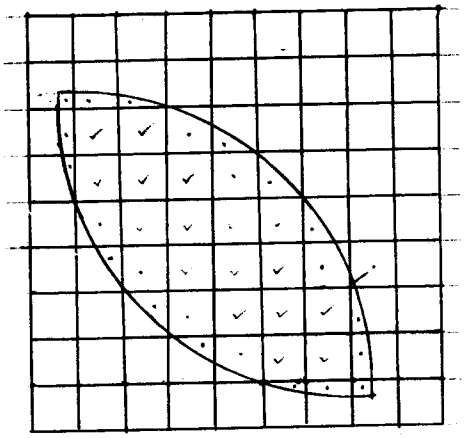
$= \frac{1}{2}\left[360^0 - \left(120^0 + 100^0 + 76^0\right)\right] = 32^0$

b) Total expenditure

$= \text{Sh. } 528 \times \frac{360}{32} = Sh.5940$

4 marks

9.



17 full squares (ticked √)

+ 24 part squares (dotted .) ÷ 2

$= \quad 17 + \frac{24}{2} = 29$

Area in mm^2 $= 29 \times 64$

$= 1856\ mm^2$

3 marks

10. a) Det. $= 3 \times 1 - 1 \times 1$
$= 2$

b) Area of image rectangle $A^1B^1C^1D^1$
$= 2 \times 15$
$= 30$ square units

3 marks

11. $\frac{ar^4}{ar} = \frac{192}{24}$

$r^3 = 8 \Rightarrow r = 2$

1st term $a = \frac{24}{2} = 12$

3 marks

12. $TQ = 34 - 25 = 9$

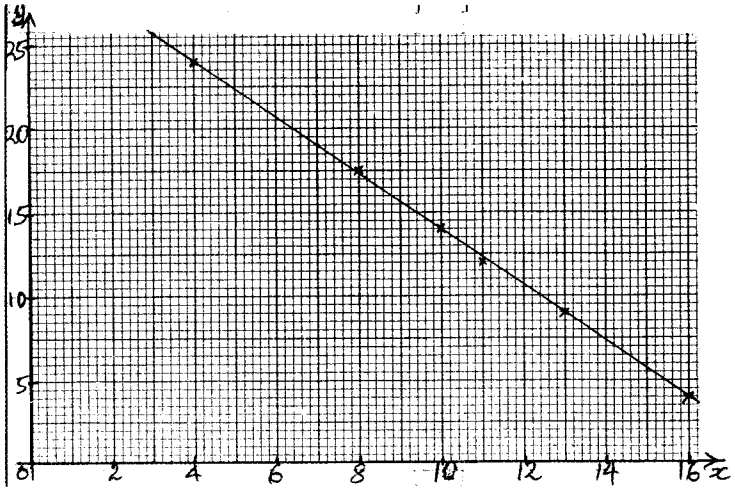
$RT.TS = x^2 = 25 \times 9 = 225$

$x = 15$

$\therefore RS = 30$

3 marks

13.



a) Points plotted
Line of best fit drawn
b) Value of y when x = 7:19

3 marks

14. Angle between A and B
$= 32.8 + 21.2 = 54^0$

Distance between A and B

$= \frac{54}{360} \times 2 \times \frac{22}{7} \times 6370$

$= 6006$

3 marks

15. Value by end of 2007

$$= \frac{102}{100} \times 720000$$

$$= 734400$$

Value by end of 2009

$$= \left(\frac{95}{100}\right)^2 \times 734400$$

$$= 662796$$

3 marks

16. Time taken from 11 am to 2.15 am

= 2h 45 min

$$\text{Average speed} = \frac{240}{2\frac{3}{4}}$$

= 80 km/h

3 marks

17. (a) (i) Simple interest:

Bal. to be charged = 80000 – 24000 = 56000

$$\therefore total\ \text{int}erest = 56000 \times \frac{15}{100} \times \frac{5}{12}$$

$$= 3500$$

(ii) Monthly instalments

$$= \frac{3500 + 56000}{5}$$

$$= Sh.11900$$

(b) Cash price with discount

$$= 80000 \times \frac{96}{100}$$

$$= Sh.76800$$

Difference in prices

24000+ (11900 x 5) – 76800

= 83500 – 76800

= Sh. 67000

10 marks

18. (a) (i) Common difference

5-2 = 8-5 = 11-8 = 3

(ii) Next two terms 14, 17

(iii) $T_{30} = 2 + (30-1)3$

= 89

(b) Number of terms

$$5430 = \frac{n}{2}(2 + 179)$$

$$n = \frac{5430 \times 2}{181} = 60$$

(c) Sum of first fifty terms

$$S_{50} = \frac{50}{2}\{2 \times 2 + (50 - 1)3\}$$

$$= 25(4+147)$$
$$= 3775$$

10 marks

19. (a)

fx
15
16
15
24
14
16

$$\frac{\sum fx}{20} = \frac{100}{20} = 5$$

(b)

$x - \bar{x}$	$f(x-\bar{x})^2$
-2	20
-1	4
0	0
1	4
2	8
3	18

$$\sum f(x-\bar{x})^2 = 54$$

$$\text{Variance} = \frac{\sum f(x-\bar{x})^2}{20}$$

$$= \frac{54}{20}$$

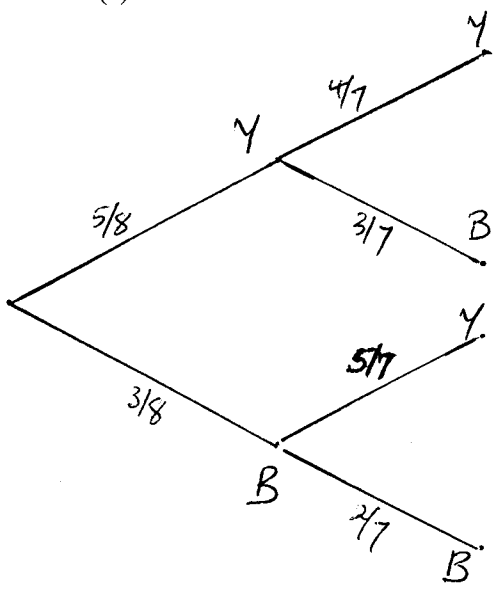
$$= 2.7$$

(c) S.D. $= \sqrt{2.7}$

$= 1.64$

10 marks

20. (a)



(b) (i) $\frac{5}{8}\times\frac{4}{7}=\frac{20}{56}=$

(ii) $\frac{5}{8}\times\frac{4}{7}+\frac{3}{8}\times\frac{2}{7}=\frac{20}{56}+\frac{6}{56}=\frac{26}{56}$

(iii) $\frac{5}{8}\times\frac{3}{7}+\frac{3}{8}\times\frac{5}{7}=\frac{15}{56}+\frac{15}{56}=\frac{30}{56}$

10 marks

21. (a) Area of Δ

$$=\frac{1}{2}\times 4\times 7\sin 100$$
$$=\frac{1}{2}\times 4\times 7\times 0.9848$$
$$=13.79\,cm^2$$

(b) $AC^2=4^2+7^2-2\times 4\times 7\cos 100$
$=16+49-56\times -0.1736$
$=65+9.7216$
$AC=\sqrt{74.7216}=8.64$

$\therefore perimeter = 8.64+4+7$
$= 19.64$

(c) $\frac{Sin\theta}{4} = \frac{\sin 100}{8.64}$

$\frac{Sin\theta}{4} = \frac{0.9848}{8.64}$

$Sin\theta = \frac{4 \times 0.9848}{8.64}$

$= 0.455925925$

$\therefore \theta = \sin^{-1} 0.455925925$

$= 27.12^0$

10 marks

22. (a) Length of line passing thro'
2=9.8; 4=9.2; 6=8; 8=6

(b) Area

$$\frac{1}{2}\times 2[10+0+2(9.8+9.2+8+6)]$$

$$=\frac{1}{2}\times 2[10+2(33)]$$

$$=\frac{1}{2}\times 2\times 76$$

$$=76$$

(c) Area of quadrant

$$=\frac{1}{4}\times 3.142\times 10^2$$

$$=78.55$$

(d) $$\% = \frac{76}{78.55}\times 100$$

$$= 97\%$$

10 marks

23. (a) (i) $\boldsymbol{AB} = 4\boldsymbol{i} + \boldsymbol{j} - (2\boldsymbol{i} + 5\boldsymbol{j})$

$= 4\boldsymbol{i} + \boldsymbol{j} - 2\boldsymbol{i} - 5\boldsymbol{j}$

$= 2\boldsymbol{i} - 4\boldsymbol{j}$

(ii) $\boldsymbol{AC} = 2(4\boldsymbol{i} + \boldsymbol{j}) - (2\boldsymbol{i} + 5\boldsymbol{j})$

$= 8\boldsymbol{i} + 2\boldsymbol{j} - 2\boldsymbol{i} - 5\boldsymbol{j}$

$= 6\boldsymbol{i} - 3\boldsymbol{j}$

(b) $\boldsymbol{OD} = 2\boldsymbol{i} + 5\boldsymbol{j} + \frac{1}{2}(6\boldsymbol{i} - 3\boldsymbol{j})$

$= 2\boldsymbol{i} + 5\boldsymbol{j} + 3\boldsymbol{i} - 1.5\boldsymbol{j}$

$= 5\boldsymbol{i} + 3.5\boldsymbol{j}$

Length of **OD**

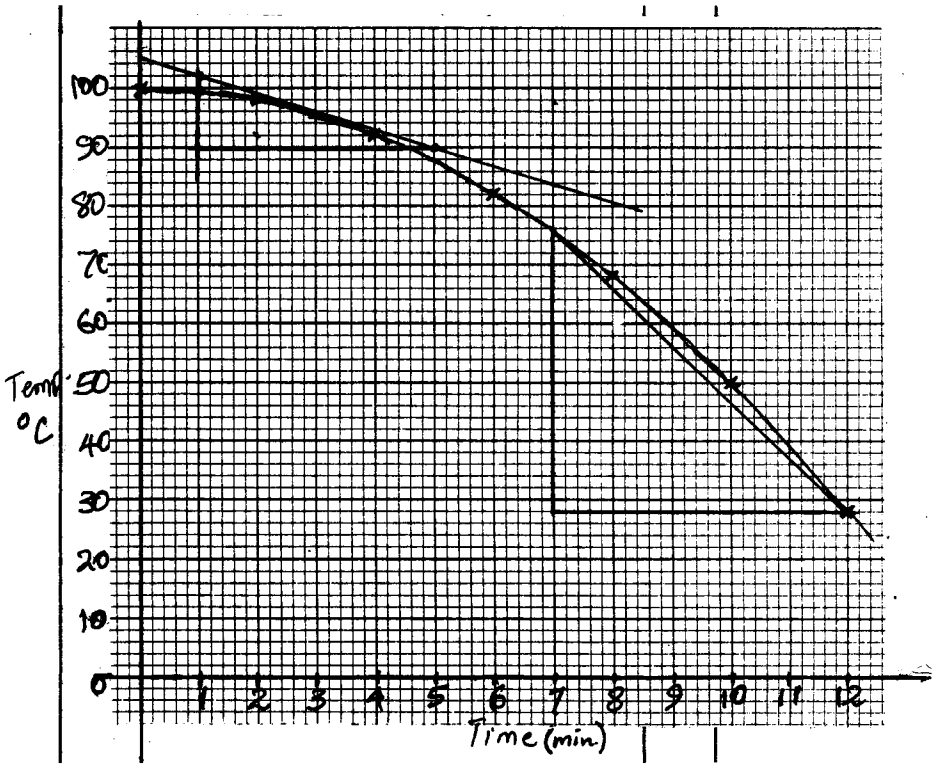
$$= \sqrt{5^2 + 3.5^2}$$

$$= 6.10$$

10 marks

24. (a)

Time (t)	0	2	4	6	8	10	12
Temp (^{0}C)	100	98	92	82	68	50	28



(b) Scale
Plotting
Smooth curve

(c) (i) $\frac{76-28}{5}$

$= \frac{48}{5} = 9.6^0$

(ii) tangent at t = 3 drawn

Gradient $\frac{102-90}{4} = 3$

10 marks