1.

$3(x-1)-(x+9)=0$.

$3x-3-x-9=0$

$2x=12$

$x=6$

2.

$45_n = 41_{ten}$

$4\times n^1+5n^0=4\times10^1\times1\times10^0$

$4n+5=41$

$4n=36$

$n=9$

3.

$2x^3=54$.

$x^3=27$

$x^3=3^3$

$x=3$

4.

$ab^2 - bc + ac$.

$= 3(-2)^2 - (-2)(4) + (3)(4)$

$= 12 + 8 + 12$

$= 32$

5. Let p be the loan, then 6000Frw $= p \times \frac{24}{100}$

$p = \frac{6000\times100}{24}$

$= 2500$Frw

6. the area of the trapezium is: $\frac{x\,(x+7+2x}{2} = 24$

$x^2+7x+2x^2=48$

$3x^2+7x-48=0$

$3x-9x+16x-48=0$

$3x(x-3)+16(x-3)=0$

$(3x+16)(x-3)=0$

$3x=-16$ *or* $x-3=0$

$x=\frac{16}{3}$ *(not valid) or* $x=3$

The value of x = 3cm

7. Let the original number be x

Then $x\times\frac{180}{100}\times\frac{160}{100}=144$

$x=144\times\frac{100}{180}\times\frac{100}{160}$

$x=50$

8. In triangle BCD, angle CBD = 90° (angle in a semicircle = 90°

AB = AD (tangents from the same external point to the circle)

So triangle ABD is isosceles hence angle ABD = angle ADB

$= \frac{1}{2}(180-40)$

$= 70°$

9. $f(4) = 3(4) + 2$

$= 12 + 2 = 14$

$g(14) = 3(14 + 2)$

$= 48$

10. $y=\frac{k}{x}$ then $xy = k$

$k = 3 \times 40$

$2.5y = 120$

$y=\frac{120}{2.5}=48$

11.

The sum of exterior angles of a polygon = 360°

So $y = 85° + y + 75 + 60 = 360°$

$2y = 220 = 360$

$y = 70°$

12. $8x + y = 21$ | $\times 4$ ...(i)

$5x - 4y = -10$ | $\times 1$...(ii)

$32x + 4y = 84$

$5x - 4y = -10$

$37x = 74$, $x = 2$

Substitute x in equation (i)

$8 \times 2 + y = 21$

$y = 21 - 16$

$y = 5$

13. Let (x,y) be any point on the line, then the gradient $= \frac{y-9}{x-1}$

But gradient is given as 5, so $\frac{y-9}{x-1}$

$= 5$

$y - 9 = 5(x - 1)$

$y = 5x + 4$

Equation of the line is $y = 5x + 4$

14. $\frac{1}{3}x-(x+1)\geq 2$

$\frac{1}{3}x - x - 1 \geq 2$

$x - 3x - 3 \geq 6$

$-2x \geq 9$

$x \leq \frac{9}{2}$

15. let the number who like both subjects be x,

- then who like maths only $= 40 - x$
- those who like science only $= 25 - x$

So, $40 - x + x + 25 - x + 2 = 50$

$67 - x = 50$

$x = 17$

17 students like both mathematics and science.

SECTION B

16. $p(x) = 6x^3 - 5x^2 - 12x - 4$

-4 can be a product of -1, 1, 4 or 2, -2, 1

Try $x - 2$ as a factor $p(x)$, then

$p(2) = 6(2)^3 - 5(2)^2 - 12(2) - 4$

so $x - 2$ is a factor of $p(x)$

$6x^3 - 5x^2 - 12x - 4$

$- 6x^3 - 12x^2$

$- 7x^2 - 12x$

$7x^2 - 12x$

$2x - 4$

$2x - 4$

0

$x - 2$

$6x^2 + 7x + 2$

$6x^2 + 7x + 2$

$= 6x^2 + 3x + 4x + 2$

$= 3x(2x + 1) + 2(2x + 1)$

$= (3x + 2)(2x + 1)$

So $p(x) = (3x + 2)(2x + 1)(x - 2)$

When $p(x) = 0$, then $(3x + 2)(2x + 1)(x - 2) = 0$

$x = -\frac{2}{3}, x = -\frac{1}{2}, x = 2$

17.

a) the curved surface of the cylinder = $2\pi rh$

$= 628cm^2$

So, $2(3.14)(10).r = 628$

$r = \frac{628}{62.8}$

$r = 10cm$

b) The base areas of the cylinder

$= 2\pi r^2$

$= 2 \times 3.14 \times 10^2 = 628cm^2$

Total surface area of the tin = 628 + 628

$=1256cm^2$

c) Volume of the tin = $\pi r^2 h$

$= 3.14 \times 10 \times 10 \times 10$

$= 3140cm^3$

d) diameter of the tin is 20cm

so along the length, there can be placed $80 \div 20$

$= 4$ tins

along the width can be placed $60 \div 20 = 3$ tins

along the height can be placed $40 \div 10 = 4$ tins

therefore, the number of tins to fill the box

$= 4 \times 3 \times 4 = 48$ tins

18. a)

Age (x)	Frequency, f	$f(x)$	Cumulative frequency
14	5	70	5
15	9	135	14
16	13	208	27
17	11	187	38
18	12	216	50
19	15	285	65
20	8	160	73
	$\sum f = 73$	$\sum f(x) = 1261$	

b) The mode is 19 years

c) The median is the

$\frac{1}{2}(73 + 1)^{th}$ age

$= 37^{th}$ age

d) The mean age

$= \frac{1261}{73}$

$= 17$ years

19. a) i)

$$\vec{a} + \vec{b} - \vec{c} = \begin{bmatrix} -5 \\ 12 \end{bmatrix} + \begin{bmatrix} 3 \\ 6 \end{bmatrix} - \begin{bmatrix} -4 \\ -2 \end{bmatrix} = \begin{bmatrix} 2 \\ 20 \end{bmatrix}$$

ii) $\vec{a} = \sqrt{(-5)^2 + 12^2}$

$= \sqrt{169}$

$= 13$

19. d)

$\vec{S}$ is parallel to $\vec{t}$, then

$t = k\vec{KS}$

$3k = 21$

$k = 3$

$t = \begin{bmatrix} 21 \\ r \end{bmatrix} = 3\begin{bmatrix} 7 \\ 4 \end{bmatrix}$

$r = 3 \times 4 = 12$

b) i) $\overrightarrow{KL} = \begin{bmatrix} 2 \\ 3 \end{bmatrix} - \begin{bmatrix} 3 \\ 6 \end{bmatrix} = \begin{bmatrix} -2 \\ -4 \end{bmatrix}$

$\overrightarrow{KL} = \sqrt{(-2)^2 + (-4)^2} = \sqrt{20} = 2\sqrt{5}$

$\overrightarrow{LM} = \begin{bmatrix} 4 \\ -1 \end{bmatrix} - \begin{bmatrix} 2 \\ 3 \end{bmatrix} = \begin{bmatrix} 2 \\ -4 \end{bmatrix}$

$\overrightarrow{LM} = \sqrt{2^2 + (-4)^2} = \sqrt{20} = 2\sqrt{5}$

19. c) $\overrightarrow{PQ} = \overrightarrow{OQ} - \overrightarrow{OP}$

$= \begin{bmatrix} 3 \\ 1 \end{bmatrix} - \begin{bmatrix} -3 \\ -2 \end{bmatrix} = \begin{bmatrix} 6 \\ 3 \end{bmatrix}$

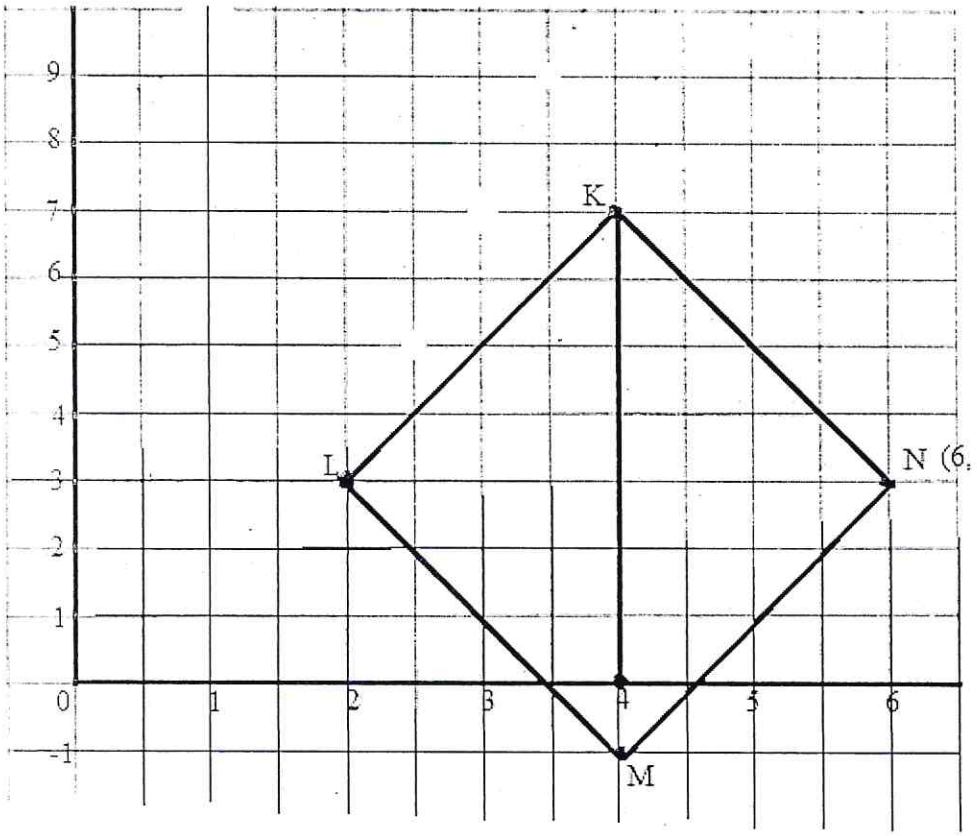
$= \overrightarrow{QR} = \overrightarrow{OR} - \overrightarrow{OQ}$

$= \begin{bmatrix} 5 \\ 2 \end{bmatrix} - \begin{bmatrix} 3 \\ 1 \end{bmatrix} = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$

$= \overrightarrow{PQ} = \overrightarrow{3QR}$

Q is common, therefore P, Q, R are collinear

b) ii)



20. Teacher's guidance