Question one:

Let $f(x) = 3x - 1$

a) Find $f(2)$

$f(2) = 3(2) - 1 = 5$

$= 5$

b) Find $f(-1)$

$f(-1) = 3(-1) - 1 = -4$

$= -4$

Question 3.

3) $z^2 - 2z + 17 = 0$.

$$\frac{-b \mp \sqrt{b^2 - 4ac}}{2a}$$

$a = 1 \quad b = -2 \quad c = 17$

$$= \frac{(-2) \mp \sqrt{(-2)^2 - (4 \times 1 \times 17)}}{2(1)}$$

$$= \frac{2 \mp \sqrt{4 - 68}}{2}$$

$$= \frac{2 \mp \sqrt{-64}}{2} = 1 \mp \frac{8i}{2} = 1 \mp 4i$$

$\therefore = 1 \mp 4i$

Question 4.

Let, for $x = \mathbb{R}$

a) Find . or $f'(x)$

Question 4.

Let $f(x)$ or $y = x^2 - 4x$, for $x \in \mathbb{R}$

a) Find $\frac{dy}{dx}$, or $f'(x)$.

$f(x) = x^2 - 4x$.

$\frac{dy}{dx} = 2x - 4$.

b) For what value of x is $f'(x) = 0$

$2x - 4 = 0$

$\frac{2x}{2} = \frac{4}{2}$

$x = 2$

Question 5

Find the area bounded by the curve $y = x^2 + x + 4$
x ordinates are,
$X = 1$
$X = 3$

Sln

$$\int_1^3 f(x)\,dx = \int_1^3 x^2 + x + 4\,dx$$

$$= \left[\frac{x^3}{3} + \frac{x^2}{2} + 4x\right]_1^3$$

$$\left\{\frac{1}{3}(3)^3 + \frac{1}{2}(3)^2 + 4(3)\right\} - \left\{\frac{1}{3}(1)^3 + \frac{1}{2}(1)^2 + 4(1)\right\}$$

$$(9 + 4.5 + 12) - \left(\frac{1}{3} + \frac{1}{2} + 4\right)$$

$25.5 - 4.83 = 20.67$ square units

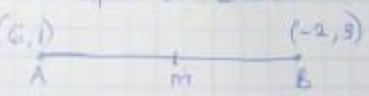
Question 6

If A (6, 1) and B (-2, 3) are two points find
i) The slope of (AB)
ii) The coordinates of the midpoint of [AB]

Gradient $= \frac{\Delta y}{\Delta x}$

$$= \frac{(3-1)}{(-2-6)} = \frac{2}{-8} = -\frac{1}{4}$$

$$= -\frac{1}{4}$$



$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$m = \left(\frac{6 + -2}{2}, \frac{1 + 3}{2}\right)$$

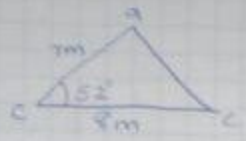
$$m = \left(\frac{4}{2}, \frac{4}{2}\right)$$

$$M = (2, 2)$$

Question 7

In the triangle abc $|ab| = 7m$, $|bc| = 8m$ $\angle abc = 52^\circ$

Calculate of the area of the triangle, correct to the nearest whole number



$$\text{Area} = \frac{1}{2} \times ab \times \sin\theta$$

$$\text{Area} = \frac{1}{2} \times 8 \times 7 \times \sin 52 = 22\ m^2$$

$$= 22\ m^2$$

Question 8

A letter is selected from the letters of the word SLLGQ

Find the probability of;

a) L

$P(L) = \frac{1}{5}, \frac{1}{5}$

b) L or O.

Total letters in the word = 5

$P(L) = \frac{1}{5}$ $P(O) = \frac{1}{5}$

$P(L \text{ or } O) = \frac{1}{5} + \frac{1}{5} = \frac{1+1}{5} = \frac{2}{5}$

c) a vowel

$P(I \text{ or } O) = \frac{1}{5} + \frac{1}{5} = \frac{2}{5}$

Question 9

4, 6, 1, 7, 2

Calculate;

a) the median

1, 2, 4, 6, 7

Median = 4

b) The mean

$4+6+1+7+2 = 20/5$

$= 4$

c) The standard deviation

$$S^2 = \frac{(4-4)^2 + (6-4)^2 + (1-4)^2 + (7-4)^2 + (2-4)^2}{5}$$

$$S^2 = (0+4+9+9+4)/5 = 26/5 = 5.2$$

$$S = \sqrt{5.2} = 2.28$$

Question 10

10 students wish wish to be in the team
A school quiz time consists of 3 students

$$10C_3 = 120$$

$= 120$ different teams

Question 11

$f(x) = 4x + 1$

a) Find the inverse $f^{-1}(x)$.

$y = 4x + 1$

$x = 4y + 1 = \frac{x-1}{4} = \frac{4y}{4}$

$f^{-1}(x) = x/4 - 1/4$

b) $f^{-1}(2)$

$= 1/4(2) - 1/4 = 1/2 - 1/4 = 1/4$

Section B.

Question 1

1. a) 6 black discs.
2 White discs.
4 green discs.

Total discs in the box = 6 + 2 + 4 = 12.

i) Both discs are black.

$P(BB) = \frac{6}{12} \times \frac{5}{11} = \frac{5}{22}$

ii) $P(WG) = \frac{2}{12} \times \frac{4}{11} = \frac{2}{33}$

i)
b)

i) The median mark

$M_e = L_o + h/f_o (n/2 - F)$

Here Median = $\frac{60}{2}$ = 40

i) Median = 31

ii) Interquartile Range = $Q_3 - Q_1$

$Q_3 = 41$ $Q_1 = 23$

$Q_3 - Q_1 = 41 - 23 = 18$

I.R = 18

SECTION B

1.c)

Minutes	No. of students(f)	m	mf	$(x_i - \bar{x})$	$(x_i - \bar{x})^2$
2-4	6	3	18	1	1
4-6	9	5	45	4	16
6-8	4	7	28	-1	1
8-10	1	9	9	-4	16
	20		100		34

i) Mean number of minutes taken per pupil,

$$\bar{X} = \frac{\Sigma mif}{\Sigma f} = \frac{100}{20} = 5$$

$$\bar{X} = 5$$

ii) The standard deviation

$$\delta = \sqrt{\frac{1}{n}(x_i - \bar{x})^2} \quad \delta = \sqrt{\left(\frac{34}{20}\right)} = \sqrt{1.7} = 1.3$$

$$= 1.3$$

3) $f(x) = x^2 + x - 6$ in the domain $-4 \leq x \leq 3$, $x \in \mathbb{R}$ SECTION B

x	-4	-3	-2	-1	0	1	2	3
y	6	0	-4	-6	-6	-4	0	6

i) The value of $f(-1) = -6$

ii) The roots of $f(x) = 0$

Roots = the points at which the graph passes the x-axis

∴ Roots of $f(x) = (-3, 2)$

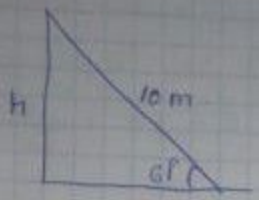
iii) The range of values of x for which $f(x)$ is increasing

The lowest value of $f(x) = -6$ when $x = 0$ and the highest is 6 when $x = 3$

∴ The range of $f(x) = -6 \leq f(x) \leq 6$

Question 1

a)



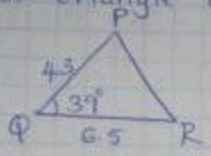
h = hypotenuse x sin θ

h = 10m sin 61

h = 8.74 ≈ 9

h = 9m

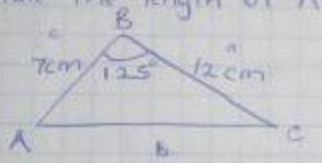
b) Area of triangle PQR.



$= \frac{1}{2}$ PR sin Q

$= \frac{1}{2} \times 4.3 \times 6.5 \sin 39 = 8.79 cm^2$

c) Calculate the length of AC.



$\frac{1}{2}$ $b^2 = a^2 + c^2 - 2ac \cos B$.

$b^2 = 12^2 + 7^2 - [(2 \times 12 \times 7) \cos 125]$

$b^2 = 193 - -96.36$

$b^2 = 289.36$

$b = 17cm$.

SECTION C

Question 2

b) a)

$h = 20t - 2t^2$

t = time in seconds

i) The height after 2 seconds

$h = 2$ $h(2) = 20(2) - 2(2)^2$

$h(2) = 40 - 8 = 32$

$h = 32\,m$

ii) The speed of the stone after 3 seconds

$\text{Speed} = \frac{\text{Distance}}{\text{time}}$

Distance $= h(3) = 20(3) - 2(3)^2$

$h(3) = 60 - 18 = 42m$

$\therefore$ Speed $= \frac{42m}{3} = 14\,m/s$

iii) The time it took the stone to reach its maximum height

$h(t) = 20t - 2t^2$

$\frac{dh}{dt} = 20 - 4t$

$-4t + 20 = 0$

$\frac{20}{4} = \frac{4t}{4}$

$t = 5$ seconds

iv) The maximum height reached by the stone

$h = 2$ $h(t) = 20t - 2t^2$

$h(5) = 20(5) - 2(5)^2$

$h(5) = 100 - 50$

$h = 50$ metres