Paper 1 June 2020

1) $4.75 = 19/4$

Learn the fractions
$\frac{1}{8}\ \frac{1}{4}\ \frac{3}{8}\ \frac{1}{2}\ \frac{5}{8}\ \frac{3}{4}\ \frac{7}{8}$
off by heart

2) Column vector a is $\begin{bmatrix} 4 \\ -2 \end{bmatrix}$

"along the corridor
down the stairs"

3) The LCM of 2 and 3 is 6. So it is

$1 \times 10^6 = 1000000$

$\left\{ \sqrt[2]{\ } \text{ is } 1000 \right\}$
$\left\{ \sqrt[3]{\ } \text{ is } 100 \right\}$

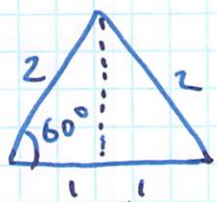
4) Reciprocal of $\frac{5}{6}$ is $\frac{6}{5}$

5) $\cos x = \frac{9}{18}$

$x = \cos^{-1} 9/18$

$= 60°$

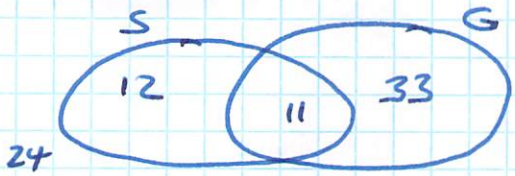
This is a non calculator paper so you need to recall the standard equilateral triangle



6)
a) Strong negative correlation
b) No correlation.

The question even lists the options so this is an easy 2 marks.

7)



80 people

30% x 80 = 24

guitar players : 80 − 24 − 12
= 44

$\frac{3}{4}$ of 44 = 33

$\frac{1}{4}$ of 44 = 11

And this completes the Venn diagram.

8)

Nearly always set the unknown for the answer required.

Perimeter = $2x + 13$

$2x + 13 = 6.5 \times 9$

$x = (6.5 \times) - 13)/2$

$= 22.75$

9

1st.	2nd	3rd	4th
	4		16

A geometric progression increases by the same ratio.

so $4 \times r^2 = 16$

$r = \sqrt{16/4}$

$= 2$

but you could have done this just by inspection.

1st term is 2
3rd term is 8

b) Arithmetic progression increases by constant value

p (+4p) $5p$ (+4p) $9p$

so $15p = 90$

$p = 6$

10.

Deposit : Total Monthly

3 : 5 2400

so we divide $2400/p = 300$

900 : 1500 2400

Monthly payment $\frac{1500}{6}$

$= £250$

11) $\frac{11}{40} = 0.275$

so $\frac{33}{400} = 0.275 \times \frac{3}{10}$

$= 0.0825$

This is a non-calculator paper so you will need to practise your basic numeracy

12)

Radius circle : $\frac{1}{4}$ circle

$\times 3$ (7 : 2, 21 : 6) $\times 3$

$\frac{1}{4}$ circle radius is 6mm

Circumference large + Perimeter small

$2\pi 21 + \frac{1}{4} 2\pi . 6 + 12$

$= 42\pi + 3\pi + 12$

$= 45\pi + 12$

13 a)

$(x + s)(x - t)$

$= x^2 + sx + tx - st$

$= x^2 + (s+t)x - st$

cf. $x^2 + kx - 40$

prime factors of 40 are $2 \times 2 \times 2 \times 5$

so factors are 1 40, 2 20, 4 10, 5 8

these are closest factors

so smallest value is $(s-t) = 3$

$k = 3$

b) $(x+2)(x-7)$

so $x = -2$ or $x = 7$

Faisal has written 2 instead of -2

14 a) $c = 2^{10} \times 3 \times 5^6$

so $18c = 18 \times 2^{10} \times 3 \times 5^6$

$= 2 \times 3 \times 3 \times 2^{10} \times 3 \times 5^6$

$= 2^{11} \times 3^3 \times 5^6$

b) $\sqrt[3]{\frac{2^7 \times 11^3}{2}}$

$= \sqrt[3]{2^6 \times 11^3}$

$= 2^2 \times 11 = 44$

15)

$3x = \frac{1}{2} y$

$6x = y$

so $x : y$

$1 : 6$

The easiest way is just to learn this by rote. The equality and the ratio switch around. But why?

16) Iterative sequence

$u_1 = 9$

$u_{n+1} = \frac{4}{u_n - 1}$

so to find u_{n+1} we just substitute value of u_n.

$u_2 = \frac{4}{9-1}$

$= \frac{4}{8}$

$u_2 = \frac{1}{2}$

$u_3 = \frac{4}{\frac{1}{2} - 1}$

$= -8$

17) Plant growth is

0	1	2	3	4
20	23	26	29	32
		3	3	

this is what you get for free

this is the jumping number.

$h = mn + C$

$h = 3n + 20$

Make sure you get the 3 and the 20 the right way round.

18)

$2x + 4y = -9$ ①

$2y = 4x - 7$ ②

you need to rearrange one or both so they follow a similar pattern.

Suppose we double ②

$4y = 8x - 14$

and ① $\rightarrow$ $4y = -2x - 9$

so $8x - 14 = -2x - 9$

$10x = 14 - 9$

$x = \frac{1}{2}$

and substitute $\frac{1}{2}$ back into ①

$1 + 4y = -9$

$y = -10/4$

$= -2\frac{1}{2}$

19) $\frac{x}{5} + \frac{x}{10} = \frac{2x}{10} + \frac{x}{10}$

$= \frac{3x}{10}$

which is one of the given answers

An easy one mark.

20) $7^0 = 1$

Any number except 0 raised to the 0^{th} power = 1

b) $32^{-3/5} = \frac{1}{32^{3/5}}$

Now $2^5 = 32$

so this reduces to

$\frac{1}{2^3} = \frac{1}{8}$

21.

$15 \cdot 6$	$3\sqrt{23}$	$2 \cdot 1^4$	$\frac{47}{3}$
↓		↓	
$15 \cdot 6$	$15-$	$16+$	$15\frac{2}{3}$

because $3\sqrt{23} < 3\sqrt{25}$

< 15

so from smallest to largest

$3\sqrt{23}$, $15 \cdot 6$, $\frac{47}{3}$, $2 \cdot 1^4$

22a) $y \propto x^3$

replace $\propto$ with $= k$

$17 = k 4^3$

$k = 17/4^3$

$y = \frac{17}{64} x$

b) $n = \frac{k}{\sqrt{r}}$

$n_1 = \frac{k}{\sqrt{4r}}$

$= \frac{k}{2\sqrt{r}}$

so value n_1 will halve.

$\div 2$

23) Add the 4 corners to make 360°

$4x + x + 36 + 5x + 30° + 92°$

$\Rightarrow 10x + 158 = 360$

$x = 20.2$

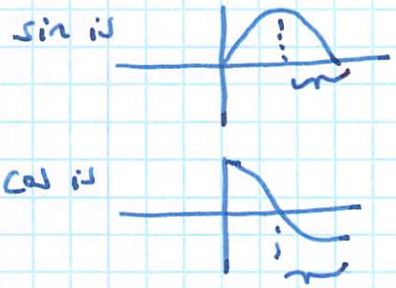
Add together opposite corners

$4 \times 20.2 + 92 = 172.8$

a cyclic quadrilateral would total 180°

ABCD not cyclic

24) y is an obtuse angle so it lies between $90 < y < 180°$



we can see sin is positive
cos is negative

We can also draw a little reminder diagram

it's ACTS but we spell it clockwise.

so it's $\sin y > 0$
$\cos y < 0$

25) The areas of a histogram bars represent the frequency

so 1st bar represents $5 \times 2 = 10$
2nd bar represents $10 \times 3 = 30$
3rd bar represents $5 \times 4 = 20$

these are the bar widths

these are the heights

where height = frequency density

so the missing bar represents 14 people

the bar width is $170 \leq h \leq 180 = 10$
so the frequency density is 1.4

Draw touching bar 1.4 high from 170 to 180.

26 a) $\frac{14}{\sqrt{7}} = \frac{14}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}}$

$= \frac{14\sqrt{7}}{7} = 2\sqrt{7}$

b) $2\sqrt{10} \times \sqrt{80} \times \sqrt{18}$

$2\sqrt{5 \times 2} \times \sqrt{8 \times 5 \times 2} \times \sqrt{9 \times 2}$

$= 2 \times \sqrt{5} \times \sqrt{2} \times \sqrt{8} \times \sqrt{5} \times \sqrt{2} \times \sqrt{9} \times \sqrt{2}$

$= 2 \times \sqrt{5} \times \sqrt{2} \times 2\sqrt{2} \times \sqrt{5} \times \sqrt{2} \times \sqrt{9} \times \sqrt{2}$

$= 4 \times (\sqrt{2})^4 \times (\sqrt{5})^2 \times 3$

$= 4 \times 4 \times 5 \times 3$

$= 240$

Ewy enough as long as you keep your wits about you.

27)

	Shape A	Shape B
Area	9	25
curved surfaces	9	25
heights	3	5

28) factorise $144 - 4x^2$

recognise this as the difference of two perfect squares

$(144 - 4x^2) =$

$(12 - 2x)(12 + 2x)$

$= 2(6 - x)\ 2(6 + x)$

$= 4(6 - x)(6 + x)$

I could have pulled the 4 out first

$144 - 4x^2 = 4(36 - x^2)$

$= 4(6 + x)(6 - x)$

29) $y = x^3 + 6$

translated 4 units to right

$f(x) = (x - 4)^3 + 6$

$= (x - 4)(x - 4)(x - 4) + 6$

$= (x^2 - 8x + 16)(x - 4) + 6$

$= x^3 - 8x^2 + 16x$
$\quad - 4x^2 + 32x - 64 + 6$

$= x^3 - 12x^2 + 48x - 58$