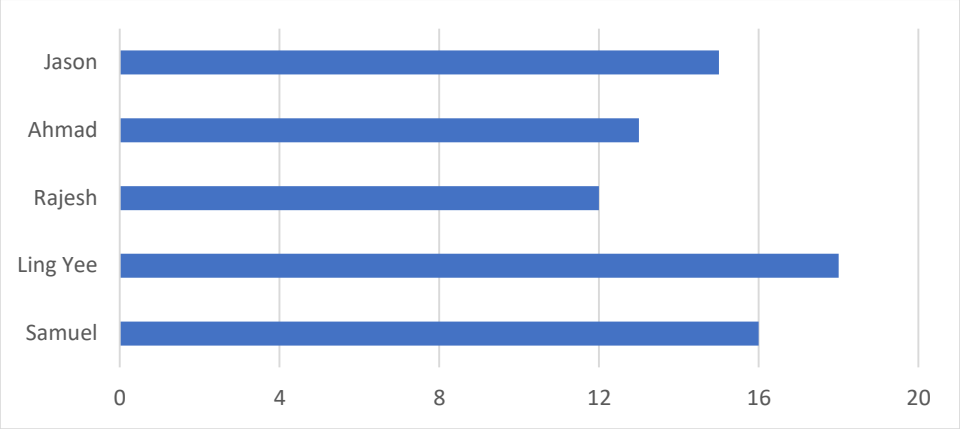


1.

The graph above shows the number of hours 5 students spend listening to music each day.

a) Who listens to the greatest number of hours?

Ling Yee

Answer: ..... [1]

b) How many more hours did Samuel listen to music than Rajesh?

16 – 12 = 4 hours

Answer: ..... [1]

2

a) Express 420 as a product of its prime numbers.

$$420 = 2^2 \times 3 \times 5 \times 7$$

Answer: ..... [1]

b) Write down the smallest positive integer, k, such that $420k$ is a perfect cube.

$$2^2 \times 3 \times 5 \times 7 = 420$$
$$2^2 \times 2 \times 3 \times 3^2 \times 5 \times 5^2 \times 7 \times 7^2 = 420k$$
$$2^2 \times 3 \times 5 \times 7 \times 2 \times 3^2 \times 5^2 \times 7^2 = 420 \times k$$
$$\therefore k = 2 \times 3^2 \times 5^2 \times 7^2$$
$$k = 22050$$

Answer: ..... [1]

3

a) What is the speed of a car if it takes 6 hours to travel 489 kilometres?

$$\begin{aligned} speed &= \frac{distance}{time} \\ &= \frac{489}{6} \\ &= 81.5\ km/h \end{aligned}$$

Answer: ..... [1]

b) What is the speed of the same car in m/s?

$$\begin{aligned} speed &= \frac{distance}{time} \\ &= \frac{489}{6} \\ &= \frac{489000}{6 \times 60 \times 60} \\ &= 22.6 m/s \end{aligned}$$

Answer: ..... [1]

4

a) Express 18% as a decimal.

$$\frac{18}{100} = 0.18$$

Answer: ..... [1]

b) Express 36 as a percentage of 50.

$$\begin{aligned} &\frac{36}{50}\% \\ &= \frac{36}{50} \times 100 \\ &= 72\% \end{aligned}$$

Answer: ..... [1]

5.

Solve the inequality $4x + 3 \geq 11$.

$$4x + 3 \geq 11$$
$$4x \geq 11 - 3$$
$$4x \geq 8$$
$$x \geq \frac{8}{4}$$
$$x \geq 2$$

Answer: ..... [2]

6.

Solve $\frac{4}{3y} - 4 = 3$.

$$\frac{4}{3y} - 4 = 3$$
$$\frac{4}{3y} = 7$$
$$3y = \frac{4}{7}$$
$$y = \frac{4}{7} \div 3$$
$$y = \frac{4}{21}$$

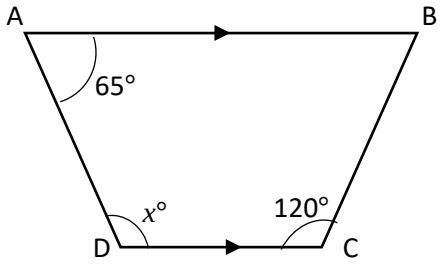
Answer: ..... [2]

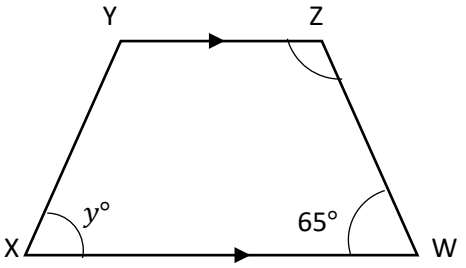
7.

Make m to be the subject of this formula.

$$\frac{2}{m - 3x} = y$$
$$2 = y(m - 3x)$$
$$2 = ym - 3xy$$
$$2 + 3xy = ym$$
$$\frac{2 + 3xy}{y} = m$$
$$m = \frac{3xy + 2}{y}$$

Answer: ..... [2]





8.

These trapeziums ABCD and WXYZ are congruent to each other.

a) Find the value of $\measuredangle x$.

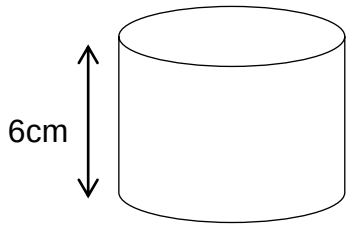
$$\measuredangle x = 180 - 65 = 115°(supplementary\ angles)$$

Answer: ..... [1]

b) Find the value of $\measuredangle y$.

$$\measuredangle y = 360° - 120 - 65 - 115 = 60°$$

Answer: ..... [1]



9

Calculate the total surface area of the cylinder with radius and height of 6cm. [3]

Total surface area of cylinder = $2\pi r^2 + \pi rh$

$$= 2\pi(36) + \pi(6)(6)$$
$$= 72\pi + 36\pi$$
$$= 108\pi$$
$$= 320.442cm^2$$
$$= 320cm^2$$

10.

Solve these simultaneous equations.

$$3x + 5y - 11 = 0$$
$$6x + 7y - 16 = 0$$

$3x + 5y = 11$ ---------- (x2) Eqn 1
$6x + 7y = 16$ ---------- (Eqn 2)

$6x + 10y = 22$ -------- Eqn 1
$6x + 7y = 16$ ---------- Eqn 2

Eqn 1 – Eqn 2

3y = 6

y = 2

Subst. y = 2 into Eqn 1

3x + 5(2) = 11

3x = 1

x = 1/3

(1/3, 2)

Answer: x = …….

y = ……[2]

11

a) Write as a single fraction in its simplest form $\frac{3}{x-2} + \frac{2}{x+2}$.

$$\frac{3}{x-2} + \frac{2}{x+2}$$

$$= \frac{3(x+2) + 2(x-2)}{(x-2)(x+2)}$$
$$= \frac{3x + 6 + 2x - 4}{(x-2)(x+2)}$$
$$= \frac{5x + 2}{(x-2)(x+2)}$$

Answer: ..... [2]

b) Simplify $\frac{2xy+4y}{2xy+6y}$.

$$\frac{2xy + 4y}{2xy + 6y}$$
$$= \frac{2y(x+2)}{2y(x+3)}$$
$$= \frac{x+2}{x+3}$$

Answer: ..... [1]

12.

Given that d is directly proportional to the square root of t.

a) Given that $d = 8$ when $t = 4$, find d when t is 16.

$$d = k\sqrt{t}$$
$$8 = k\sqrt{4}$$
$$k = 4$$

$$d = 4\sqrt{16}$$
$$d = 4(\sqrt{16})$$
$$d = 16$$

Answer: ..... [1]

b) Find the value of t when $d = 20$

$$d = 4\sqrt{t}$$
$$20 = 4\sqrt{t}$$
$$t = 25$$

Answer: ..... [2]

13.

The ratio of the number of red marbles to green marbles was 2 : 5. The total number of marbles was 49.

a) How many red marbles were there?

Red : green : Total
2 : 5 : 7

7 parts = 49
2 parts = (2x49)/7 = 14

Answer: ..... [1]

b) When a number of red marbles was added, the new ratio of the red marbles to green marbles was now 8 : 5.

How many red marbles were added?
5 parts = (5x49)/7 = 35
5 parts = 35
8 parts = (8x35)/5 = 56
Red marbles added = 56 – 14 = 42

Answer: ..... [2]

14.

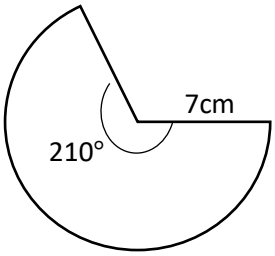
Calculate the perimeter of a sector of a circle of radius 7cm and angle 210°.

Perimeter = Arc Length + radius + radius

$= \frac{210}{360} \times 2 \times \pi \times 7 + 7 + 7 =$

39.66 cm

= 39.7 cm (3 s.f.)



Answer: ……cm [3]

15.

a) Evaluate 7^{-3}.

$$7^{-3}$$
$$= \frac{1}{7^3}$$
$$= \frac{1}{343}$$

Answer: …… [1]

b) Given that $8^{\frac{4}{3}} = 2^y$, find y.

$$8^{\frac{4}{3}} = 2^y$$
$$2^{3\left(\frac{4}{3}\right)} = 2^y$$
$$2^4 = 2^y$$
$$4 = y$$

y = 4

Answer: …… [2]

16.

The table below shows the weekly number of hours of overtime done by the workers of a company.

No of hours (Overtime)	Number of workers
$0 < x \leq 5$	5
$5 < x \leq 10$	12
$10 < x \leq 15$	40
$15 < x \leq 20$	28
$20 < x \leq 25$	8
$25 < x \leq 30$	7

a) Find the percentage of employees who did overtime less than or equal to 10 hours per week.

17/100 x 100% = 17%

Answer: ..... [1]

b) Find the median.

100/2 = 50^{th} & 51^{st} lies in $10 < x \leq 15$

Median = $10 < x \leq 15$

Answer: ..... [1]

c) Calculate an estimate of the mean number of overtime hours of the workers.

$$\frac{(2.5\times5)+(7.5\times12)+(12.5\times40)+(17.5\times28)+(22.5\times8)+(27.5\times7)}{5+12+40+28+8+7}$$

Answer: ..... [2]

17.

Factorise

a) $2z^2 + z - 10$

	2z	+5
z	$2z^2$	5z
-2	-4z	-10

$$2z^2 + z - 10 = (z - 2)(2z + 5)$$

Answer: ..... [2]

b) $10ax + 4ay + 15bx + 6by$

2a(5x+2y) + 3b(5x+2y)

= (2a+3b)(5x+2y)

Answer: ..... [2]

18.

a) A map has a scale of 1 : 200 000. The distance between two cities on the map is 8cm. Calculate the actual distance, in kilometres, between the two cities.

Map	:	Actual
1	:	200 000
1	:	200000/(1000x100)
1	:	2km
8cm	:	8x2 = 16km

Answer: ……km [2]

b) A reservoir on the same map covers an area of 14km². Calculate the area, in square centimetres, covered by the reservoir on the map.

Map	:	Actual
1cm	:	2km
Area => $(1cm)^2$	:	$(2km)^2$
$1cm^2$	:	$4km^2$
14/4	:	$14km^2$
$3.5cm^2$	:	$14km^2$

Answer: ……cm² [2]

19.

a) Solve $x^2 - x - 6 = 0$

$x^2 - x - 6 = 0$
$(x + 2)(x - 3) = 0$
$x = -2$ or 3

Answer: x = …… or …… [2]

b) $x^2 - 2x - 6 = (x + a)^2 + b$

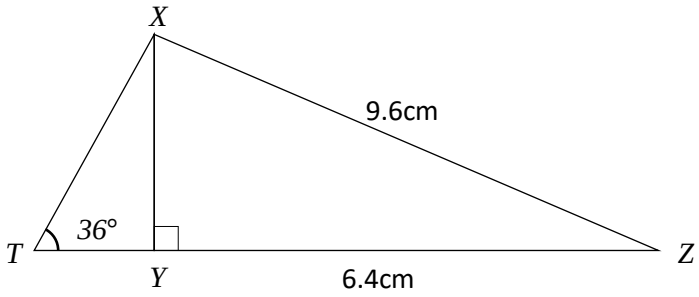
By completing the square, determine the values of a and b.

$x^2 - 2x + 1^2 - 6 - 1$
$(x-1)^2 - 7$
$a = -1, b = -7$

Answer: a = …… & b = …… [2]

20.

The figure below is made up of two triangles. Triangles TXY and ZXY. In triangle TXY, angle XTY = 36°. Y is a point on TZ such that XY is perpendicular to TZ. YZ = 6.4cm and XZ = 9.6cm.



a) Find angle YXZ.

$$\sin\theta = \frac{6.4}{9.6}$$
$$\theta = \sin^{-1}\frac{6.4}{9.6}$$
$$\theta = 41.8°$$

Answer ……..…….. [2]

b) Find the length of TX.

180 - 90 - 41.8 = 48.2

$$\frac{\sin 36}{9.6} = \frac{\sin 48.2}{TX}$$
$$TX = \frac{9.6 \times \sin 48.2}{\sin 36}$$
$$TX = 12.2cm$$

Answer ……[2]

21.

a) Calculate the gradient of the line joining the points (3,4) and (-1,1).

$$m = \frac{1-4}{-1-3}$$
$$= \frac{-3}{-4}$$
$$= \frac{3}{4}$$

Answer: ..... [2]

bi) Find *x* given that point (6 , 8) and (x , 11) has the same gradient as (3 , 4) and (-1 , 1)

$$\frac{11-8}{x-6} = \frac{3}{4}$$
$$\frac{3}{x-6} = \frac{3}{4}$$
$$\frac{12}{3} = x - 6$$
$$10 = x$$

Co-ordinates (10,11)

Answer: *x* = ...[2]

bii) If the line cuts the *y*-axis at the co-ordinates $(0, \frac{7}{4})$, determine the equation of this line.

y=mx+c

y=3/4x + c [Substitute (0, 7/4)]

7/4 = ¾(0) + c

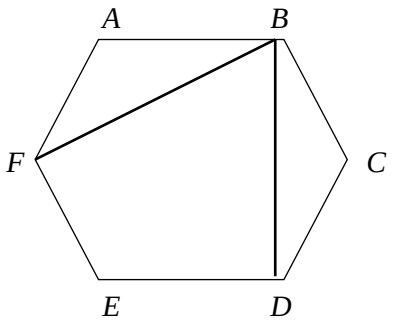
c = 7/4

y=3/4x+7/4

Answer: .....[1]

22.

The figure shows a regular hexagon, $ABCDEF$.



a) Find angle FBA.

$$\frac{(n-2)\times 180}{n} = \frac{4\times 180}{6} = 120°$$

Angle FBA = (180-120)/2 = 30°

Answer ..... [2]

b) What is a special name given to triangle FAB.

$$triangle\ FAB\ is\ an\ isosceles\ triangle.$$

Answer: ..... [1]

c) Find angle FBD.

Angle ABC = 120°, angle FAB & CBD = 30°
Angle FBD = 120 – 30 – 30 = 60°.

Answer .....[2]

23.

Adilah, Adib and Ah Seng wants to buy a computer that costs $2800.

a) Adilah paid for the computer in cash was given a discount. Calculate the percentage discount that she received given that she paid $2380 for the computer.

$$2800 - 2380 = \$420$$
$$420 \div 2800 \times 100\% = 15\%$$

Answer: ..... [2]

bi) Adib paid an initial deposit of $400 and paid the rest in monthly instalments of $150 for a period of 2 years. How much did Adib actually pay for the computer?

$$\text{Adib} = 400 + (150 \times 24) = \$4000$$

Answer: ..... [2]

bii) Ah Seng decided to take a bank loan to pay for the computer. He has to pay back the loan completely by 2 years. The bank charges a compound interest of 2.5% compounded yearly. Calculate total amount Ah Seng had to pay for the computer.

$$\text{Total} = P(1+2.5/100)^2 = \$2941.75$$

Answer: ..... [2]

24.

a) Find the radius of a sphere that has a surface area of 255cm^2.

$$4\pi r^2 = 255$$
$$r^2 = 255 \div 4\pi$$
$$r = 4.50$$

Answer: ..... [2]

b) Find the volume of the same sphere.

$$\text{Vol} = \frac{4}{3}\pi r^3 = 383 \text{ (3 s.f.)}$$

Answer: ..... [2]

c) The sphere then is melted and formed into a cube. Find the length of a side of the cube.

$$L^3 = 382$$
$$L = 7.26\text{cm (3 s.f.)}$$

Answer: ..... [2]

Table of Specifications (TOS)

Paper 1 Total marks = 80

Difficulty Level ***Topic***	***Simple Question***	***Sub-Total Marks***	***Moderate Question***	***Sub – Total Marks***	***Challenging Question***	***Sub-Total Marks***
	1, 2, 3, 4, 5, 6, 7, 8, 10	18	12, 13, 14, 15	*12*	*23, 24, 25,26*	*24*
	9, 11	*6*	*18, 19, 20, 21, 22*	*20*		
Total Marks	***Simple***	***24***	***Moderate***	***32***	***Challenging***	***24***
Weightage		***30%***		***40%***		***30%***