NA

TAMPINES SECONDARY SCHOOL

Secondary Four Normal Academic
PRELIMINARY EXAMINATION 2023

NAME							
CLASS					**REGISTER NUMBER**		

MATHEMATICS SYLLABUS A **4045/01**

Paper 1 **04 August 2023**

2 hours

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

For Examiner's Use

Write your name, class and register number on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** the questions.
If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
The use of an approved scientific calculator is expected, where appropriate.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is **70**.

Mathematical Formulae

Compound Interest

$$\text{Total amount} = P\left(1+\frac{r}{100}\right)^n$$

Mensuration

Curved surface area of a cone = πrl

Surface area of a sphere = $4\pi r^2$

Volume of a cone = $\frac{1}{3}\pi r^2 h$

Volume of a sphere = $\frac{4}{3}\pi r^3$

Area of a triangle *ABC* = $\frac{1}{2}ab\sin C$

Arc length = $r\vartheta$, where ϑ is in radians

Sector area = $\frac{1}{2}r^2\vartheta$, where ϑ is in radians

Trigonometry

$$\frac{a}{\sin A}=\frac{b}{\sin B}=\frac{c}{\sin C}$$

$$a^2=b^2+c^2-2bc\cos A$$

Statistics

$$\text{Mean} = \frac{\Sigma fx}{\Sigma f}$$

$$\text{Standard deviation} = \sqrt{\frac{\Sigma fx^2}{\Sigma f}-\left(\frac{\Sigma fx}{\Sigma f}\right)^2}$$

Answer all questions.

1 **(a)** Calculate the exact value of $\frac{11.2\times3}{8.2-4.7}$.

Answer **(a)** _____ [1]

(b) Calculate $\sqrt{5.1+3.75^2}$.
Give your answer correct to 1 decimal place.

Answer **(b)** _____ [1]

2 $0.31\dot{2}$ $\frac{5}{7}$ $\frac{\pi}{2}$ 21 $\sqrt{64}$

For the above values, state which

(a) is/ are recurring decimal/s?

Answer **(a)** _____ [1]

(b) has/ have a factor of 3?

Answer **(b)** _____ [1]

(c) is/ are rational number/s?

Answer **(c)** _____ [1]

3 Find the largest integer satisfying $-4x \geq 73$.

Answer _____ [2]

4 Given that $x^2 + 10x + 21 = (x + a)^2 + b$,

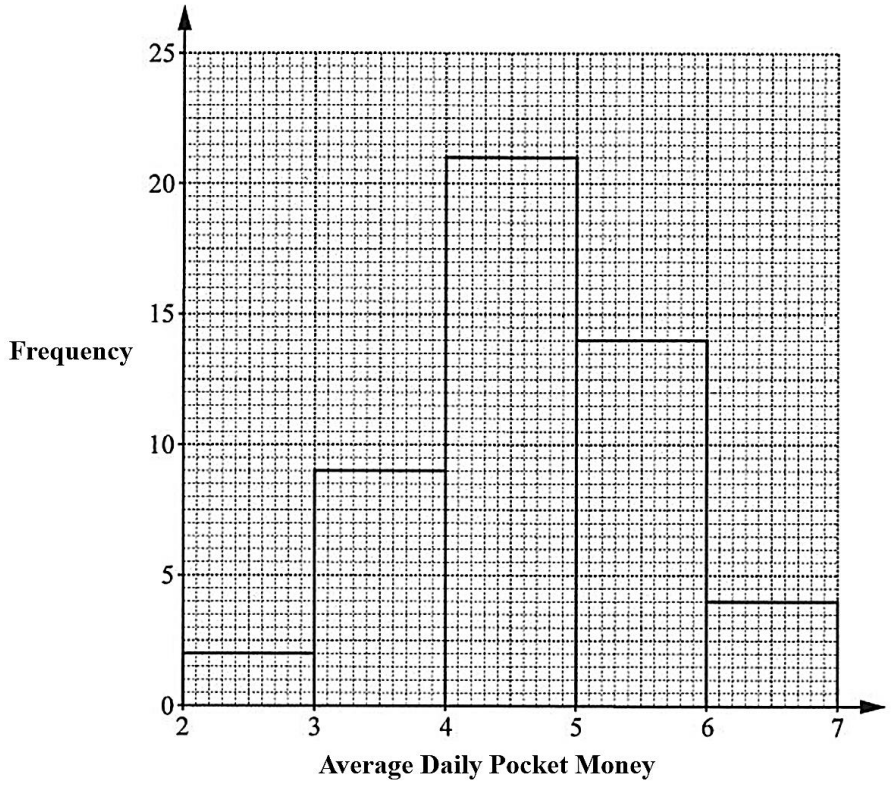
(a) find a and b.

Answer a = _____ b = _____ [3]

(b) Hence, solve $x^2 + 10x + 21 = 0$

Answer x = _____ or _____ [3]

5 The following histogram summarises the average daily amount of pocket money from a group of 50 students.



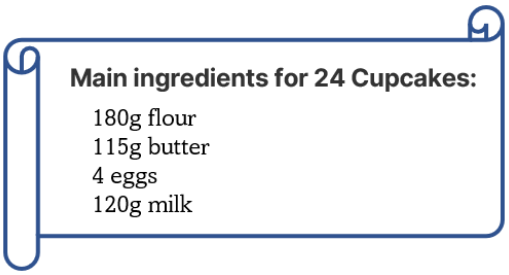
(a) How many students have an average daily pocket money of \$3 to \$4?

Answer **(a)** _____ [1]

(b) Find the probability of a student having at least \$5 of average daily pocket money, leaving your answer in simplest form.

Answer **(b)** _____ [1]

6



A baker is left with 250 eggs and plenty of other ingredients.

(a) Using the above recipe, calculate the maximum amount that can be received from selling the cupcakes made with these remaining eggs, given that each cupcake is sold at $1.80.

Answer **(a)** $_____ [3]

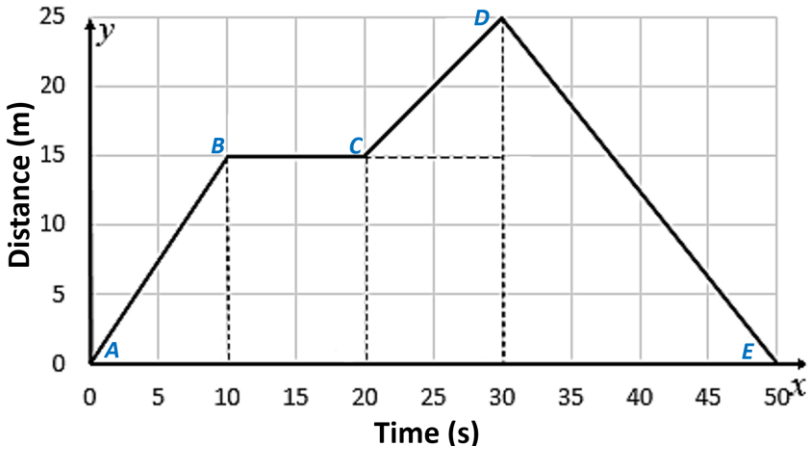
(b) Calculate the percentage of these 250 eggs which were not used.

Answer **(b)** _____ % [2]

(c) Find the ratio of butter: flour **and** milk.

Answer **(b)** _____ : _____ [2]

7 The distance-time graph shows the movement of an electric toy car.



(a) 'The toy car is travelling at a greater speed at ***CD*** than at ***AB***.'
Justify whether the above statement is correct.

Answer

_____ [2]

_____

_____

_____

(b) What is the duration when the toy car is at rest?

Answer **(b)** _____ [1]

(c) Describe the motion of the electric toy car at ***DE***.

Answer

_____ [1]

_____

_____

_____

(d) Find the average speed of the toy car for the whole journey.

Answer **(d)** _____ m/s [2]

8 **(a)** Written as a product of prime factors, $1050 = 2^x \times 3 \times 5^y \times 7$.
Find the values of x and y.

Answer **(a)** $x =$ _____ $y =$ _____ [2]

(b) Find the smallest positive integer k, such that $1050k$ is a perfect square.

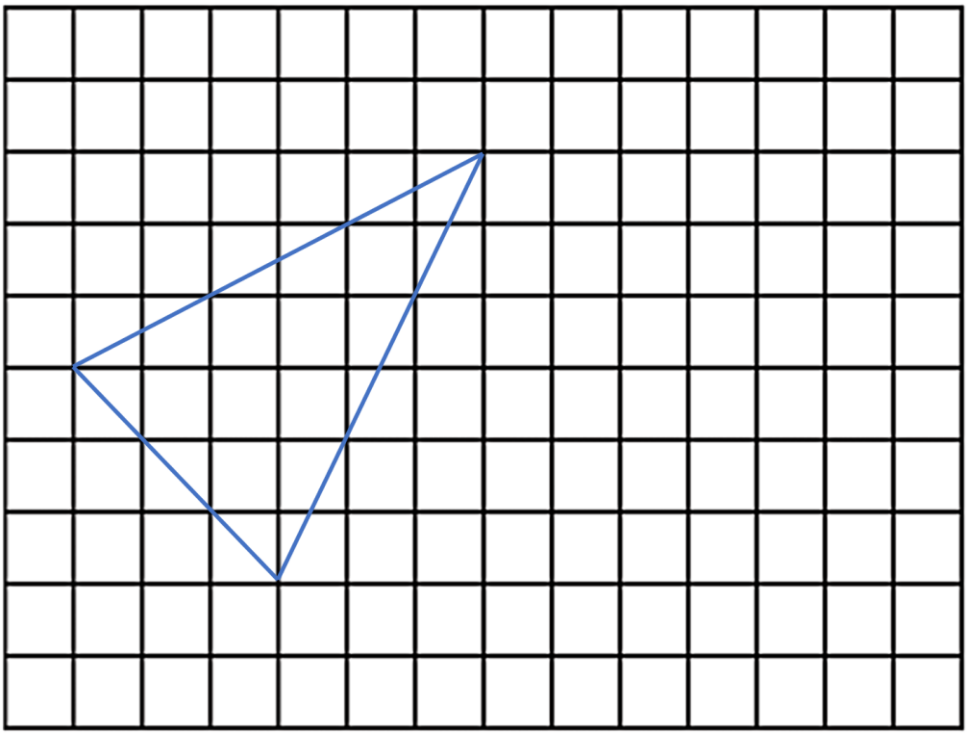
Answer **(b)** $k =$ _____ [1]

(c) Given that $700 = 2^2 \times 5^2 \times 7$, find the highest common factor of 700 and 1050.

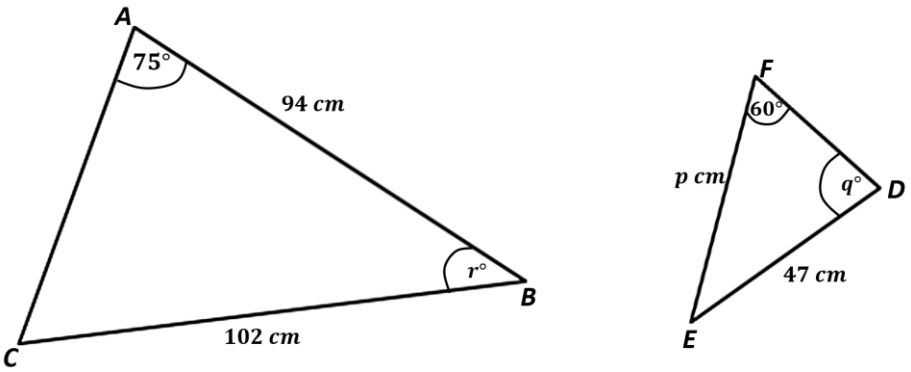
Answer **(c)** _____ [2]

9 Draw a reduction of this triangle using a scale factor of $\frac{1}{3}$. [2]

Answer



10 In the diagram below, triangle ABC is similar to triangle DEF. Find



(a) p,

Answer **(a)** _____ [1]

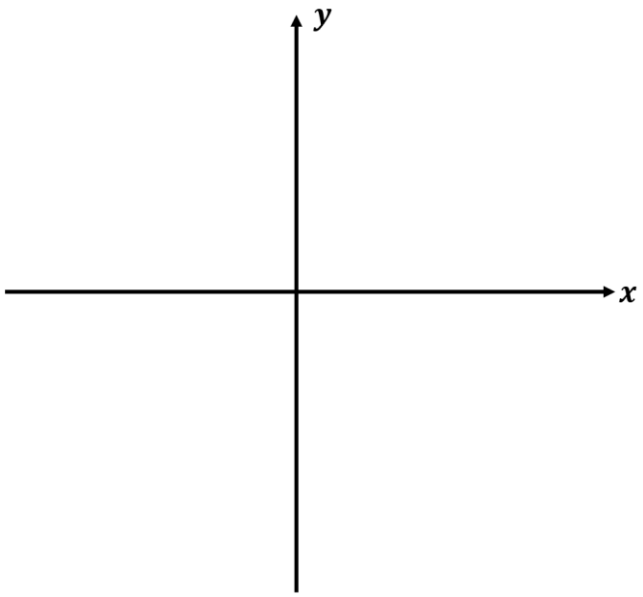
(b) q,

Answer **(b)** _____ [1]

(c) r.

Answer **(c)** _____ [2]

11 **(a)** Sketch the graph of $y = (x + 2)(x - 4)$. [2]



(b) Write down the equation of the line of symmetry of the graph.

Answer **(b)** _____ [1]

(c) State the coordinates of the turning point.

Answer **(c)** _____ [1]

12 The cash price of a television is \$6200.
The hire-purchase price of the television is \$7400.
The hire-purchase price is a deposit of 10% of the cash price plus 12 equal monthly payments.

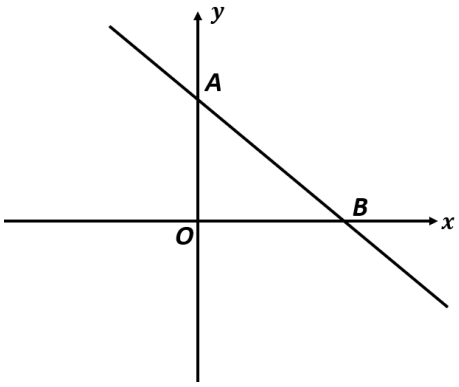
(a) Calculate the deposit amount.

Answer **(a)** \$ _____ [2]

(b) Calculate each monthly payment.

Answer **(b)** \$ _____ [2]

13 The diagram below shows a graph of $y + 2x = 18$.



(a) Find the coordinates of A and B.

Answer **(a)** Coordinates of $A =$ (,) [1]

Coordinates of $B =$ (,) [1]

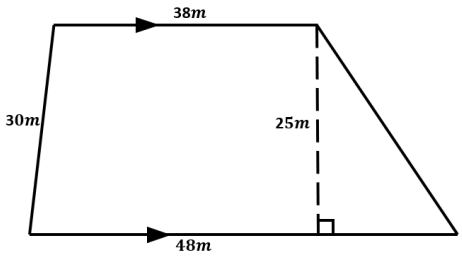
(b) Find the distance between the origin and the point $M(8, 20)$.

Answer **(b)** _____ *units* [2]

14 Given that the line formed by points $A(p, 7)$ and $B(-2, 0)$ is parallel to $y = \frac{1}{2}x - 5$, find the value of p.

Answer $p =$ _____ [2]

15



Calculate the area of the above figure.

Answer _____ m^2 [2]

16 Factorise

(a) $x^2 + x - 6$,

Answer **(a)** _____ [1]

(b) $50y^2 - 18$

Answer **(b)** _____ [2]

17 **(a)** Make p the subject of the formula $\frac{3p}{q} = 5r$.

Answer **(a)** $p =$ _____ [1]

(b) Express as a single fraction, in its simplest form, $\frac{1}{x^2-9} + \frac{2}{x+3}$.

Answer **(b)** _____ [2]

18 Ali chooses a pen from the following options.

Brand
X
Y

Colour
Red (R)
Blue (B)
Green (G)

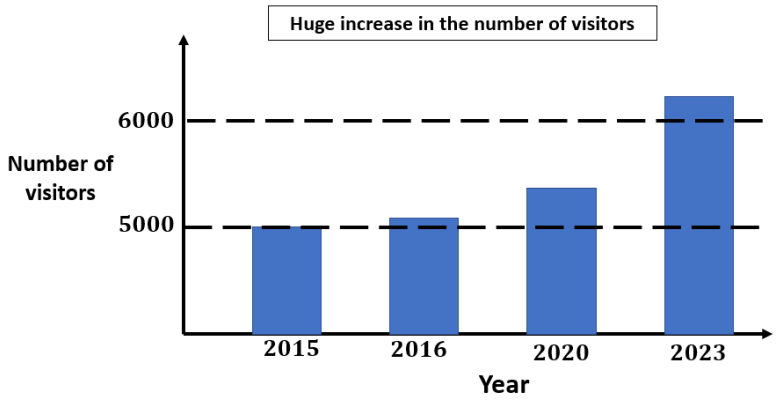
(a) Complete the table to show all his possible choices. [2]

Brand	Colour
X	R
X	B
X	G
Y	R

(b) Find the probability, in its simplest form, that Ali chooses a blue pen.

Answer _____ [1]

19 The graph below shows the average number of visitors to a game park over a period.



(a) Suggest one reason why the graph is inaccurately represented.

Answer

_____ [1]

_____

_____

(b) Explain how your answer in (a) may cause the graph to be misleading.

Answer

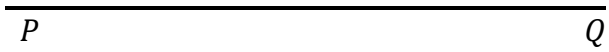
_____ [1]

_____

_____

20 PQR is a triangle with $PQ = 8cm$, $PR = 4\ cm$ and $QR = 6cm$.

(a) Construct triangle PQR. [2]
PQ has been drawn for you.



(b) Measure angle QPR.

Answer _____ [1]

(c) Construct the perpendicular bisector of PQ. [1]

END OF PAPER