

Name: Solutions

Class: 8M20_____

CHERRYBROOK TECHNOLOGY HIGH SCHOOL



YEAR 8 MATHEMATICS

2020 CAT3 YEARLY EXAMINATION

Time allowed – 30 minutes

**General
Instructions**

- Attempt all questions in the spaces provided
 - Write your name on the question paper
 - Write using black pen
 - All necessary working should be shown
-

Part 1 Number and Algebra		Marks
MA4-4NA	Compares, orders and calculates with integers, applying a range of strategies to aid computation	/2
MA4-5NA	Operates with fractions, decimals and percentages	/6
MA4-6NA	Solves financial problems involving purchasing goods	/3
MA4-7NA	Operates with ratios and rates, and explores their graphical representation	/2
MA4-8NA	Generalises number properties to operate with algebraic expressions	/4
MA4-9NA	Operates with positive-integer and zero indices of numerical bases	/6
MA4-10NA	Uses algebraic techniques to solve simple linear and quadratic equations	/8
MA4-11NA	Creates and displays number patterns; graphs and analyses linear relationships	/4
TOTAL:		/35

Question 1**Marks**

Evaluate the following, correct to 2 decimal places:

$$\frac{\sqrt{144.4}}{7.05 + 2.525}$$

1

1.26

Question 2Evaluate $(-3 \times 5^2 - 20) + 7$ **1**

$$= (-3 \times 25 - 20) + 7$$

$$= (-75 - 20) + 7$$

$$= -88$$

Question 3

Which of these is the largest?

10.009 9% $\left(\frac{9}{10}\right)$ **Question 4**

A cup is three fifths full. If there is 60 mL of liquid currently in the cup, how much more liquid is needed to fill the cup?

1

$$\frac{3}{5} \times \text{cup} = 60 \text{ mL}$$

$$\text{cup} = \frac{5}{3} \times 60 \text{ mL}$$

$$= 100 \text{ mL}$$

need 40mL more

Question 5**Marks**

Increase 120 km by 30%.

2

$$1.3 \times 120 \text{ km} = 156 \text{ km}$$

Question 6

A cake weighing 200 g is made of 100 g flour, 50 g sugar, 30 g butter and 20 g of eggs.
What percentage of the weight is eggs?

2

$$\begin{aligned} \text{eggs} &= \frac{20}{200} \times 100\% \\ &= 10\% \end{aligned}$$

Question 7

Liam buys a car for \$14 400 and then sells it for \$12 100 two years later.

(a) How much money did he lose on the resale?

1

$$\begin{aligned} \text{loss} &= 14\,400 - 12\,100 \\ &= \$2\,300 \end{aligned}$$

(b) Calculate his loss as a percentage of the original price.
Give your answer to the nearest whole number.

1

$$\begin{aligned} \% \text{ loss} &= \frac{2300}{14\,400} \times 100\% \\ &= 16\% \end{aligned}$$

Question 8**Marks**

The price of a necklace before a GST of 10% is added is \$20. Calculate the price after GST is added.

1

$$\begin{aligned} \text{price} &= 1.1 \times \$20 \\ &= \$22 \end{aligned}$$

Question 9

A motor bike travelled 78 kilometres between 10:00 a.m. and 11:30 a.m. What is the average speed in km/h?

1

$$\begin{aligned} S &= \frac{78 \text{ km}}{1.5 \text{ h}} \\ &= 52 \text{ km/h} \end{aligned}$$

Question 10

Simplify the ratio 42:48

1

$$7:8$$

Question 11

Simplify $4x + 3 + 5x + 2y =$

1

$$8x + 2y + 3$$

Question 12

Expand and simplify $5(m + 3) + 8m$

1

$$= 5m + 15 + 8m$$

$$= 13m + 15$$

Question 13**Marks**Factorise fully $25x - 5xy$ **2**

$$5x(5-y)$$

Question 14

Simplify the following, leaving your answer in index form.

(a) $2^4 \times 2^3 \times 2 =$

1

$$2^8$$

(b) $\frac{7^{20}}{7^5} =$

1

$$7^{15}$$

(c) $2 + (6)^0 =$

1

$$= 2 + 1$$

$$= 3$$

Question 15

(a) Write $(4^3)^3$ in expanded form.

1

$$= 4^3 \times 4^3 \times 4^3$$

$$= 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4$$

(b) Hence, express $(4^3)^3$ with a prime base in simplest index form.

2

$$4^9$$

Question 16**Marks**

Solve the following equations.

(a) $8x - 2 = 4x + 6$

2

$$4x - 2 = 6$$

$$4x = 8$$

$$x = 2$$

(b) $\frac{5 - 4p}{3} = -5$

2

$$5 - 4p = -15$$

$$-4p = -20$$

$$p = 5$$

Question 17Solve the following equation for x :**2**

$$x^2 = 25$$

$$x = \pm 5$$

Question 18**Marks**

When 3 is subtracted from a number (x) and then multiplied by 5, the result is 10.

- (a) Write an equation from the information above.

1

$$5(x-3) = 10$$

- (b) Solve the equation to find the number.

1

$$x-3 = 2$$

$$x = 5$$

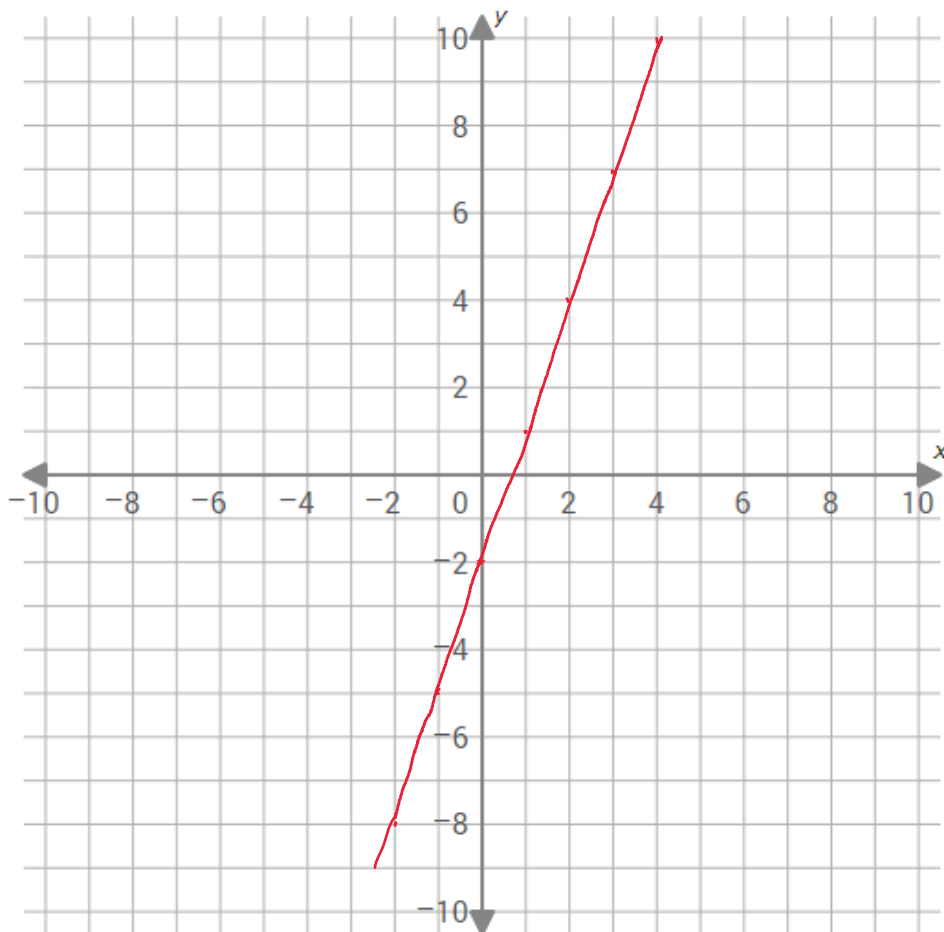
See over for Question 19

Question 19**Marks**Complete the following table when $y = 3x - 2$ **2**

(a)

x	-2	-1	0	1	2
y	-8	-5	-2	1	4

(b)

Draw the line represented by $y = 3x - 2$ on the number plane below.**2****END OF PAPER**

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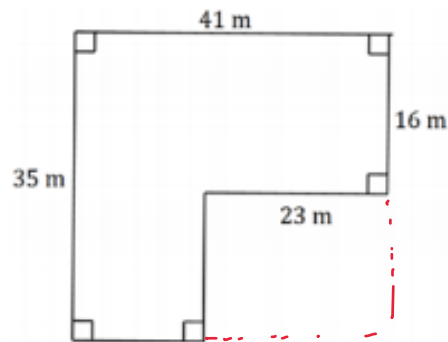
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Part 2 Measurement and Geometry		Marks
MA4-12MG	calculates the perimeters of plane shapes and the circumferences of circles	/6
MA4-13MG	uses formulas to calculate the areas of quadrilaterals and circles, and converts between units of area	/7
MA4-14MG	uses formulas to calculate the volumes of prisms and cylinders, and converts between units of volume	/6
MA4-18MG	identifies and uses angle relationships, including those related to transversals on sets of parallel lines	/6
MA4-17MG	classifies, describes and uses the properties of triangles and quadrilaterals, and determines congruent triangles to find unknown side lengths and angles	/6
MA4-16MG	applies Pythagoras' theorem to calculate side lengths in right-angled triangles, and solves related problems	/4
	TOTAL:	/35

Question 1**Marks**

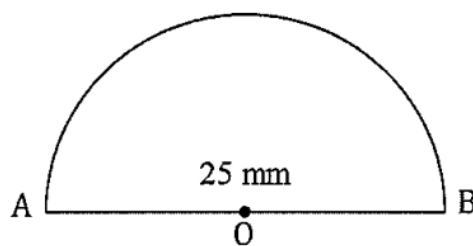
What is the perimeter of the irregular block of land shown?

2

$$P = 2 \times (35 + 41)$$

$$= 2 \times 76$$

$$= 152 \text{ m}$$

Question 2Find the perimeter of this semi-circle, correct to the nearest mm. $AB = 25 \text{ mm}$ **2**

$$P = \pi \times 25 + 25$$

$$= 104 \text{ mm}$$

Question 3**Marks**

Convert:

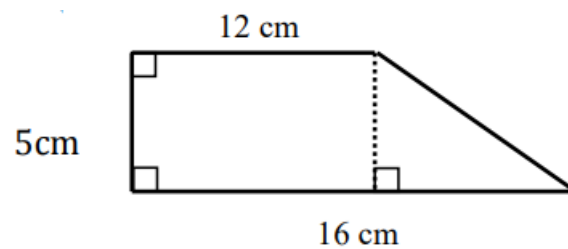
(a) 45.6 m to cm

1*4560 cm*

(b) 7 654 kg to tonnes

1*7.654 tonnes.***Question 4**

Calculate the area of the following shape. Diagram is not to scale.

2

$$A = \frac{5}{2} (12 + 16)$$

$$= \frac{5}{2} \times 28$$

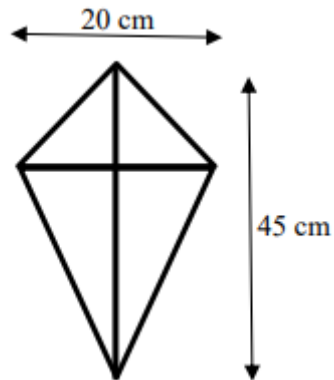
$$= 70 \text{ cm}^2$$

Question 5

Marks

Calculate the area of the kite. Diagram is **not to scale**.

1



$$A = \frac{1}{2} \times 20 \times 45$$

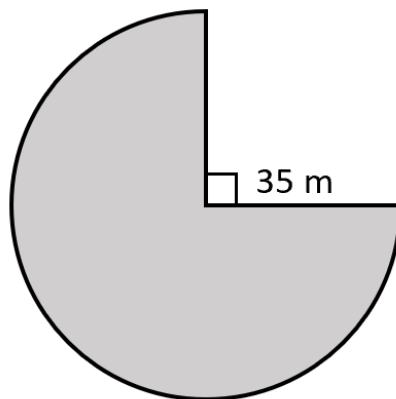
$$= 450 \text{ cm}^2$$

Question 6

Joyce is a cotton farmer. She uses a sprinkler to water her cotton. The sprinkler rotates and covers an area as shown in the diagram.

2

Calculate the area that is watered by the sprinkler, correct to the nearest m^2 .



$$A = \pi \times 35^2$$

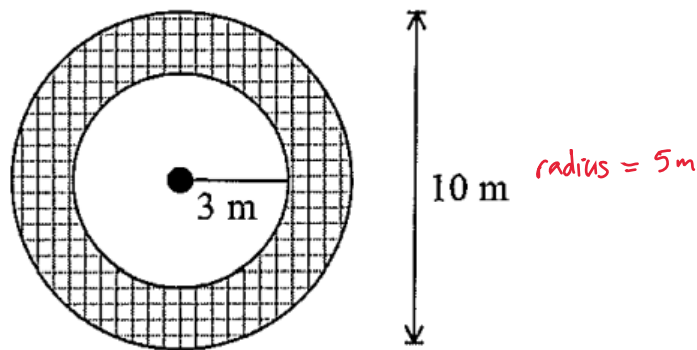
$$= 3848 \text{ m}^2$$

Question 7

Marks

Calculate the area of the shaded region, correct to one decimal place.

2



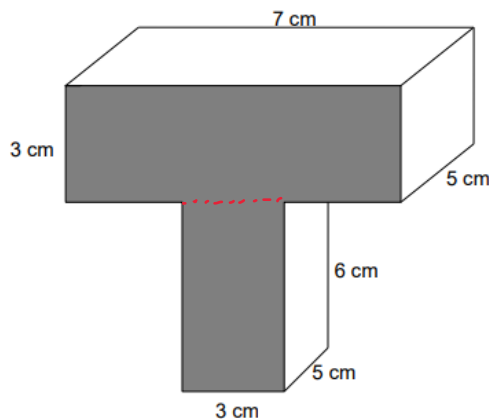
$$A = \pi \times 5^2 - \pi \times 3^2$$

$$= 25\pi - 9\pi$$

$$= 16\pi$$

$$= 50.3 \text{ m}^2$$

Question 8



- (a) Calculate the area of the shaded cross section of the solid prism above.

2

$$A = 3 \times 7 + 6 \times 3$$

$$= 21 + 18$$

$$= 39 \text{ cm}^2$$

- (b) Hence, calculate the volume of the solid.

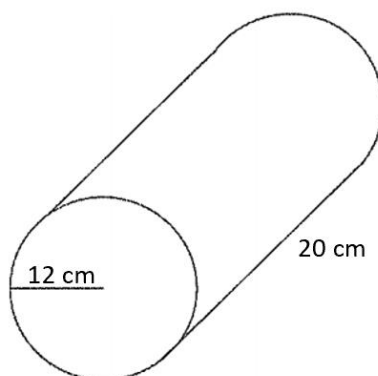
1

$$V = 39 \times 5$$

$$= 195 \text{ cm}^3$$

Question 9

Marks



- (a) Calculate the volume of this cylinder, correct to the nearest cubic centimetre.

2

$$V = \pi \times 12^2 \times 20$$

$$= 2880 \pi$$

$$= 9048 \text{ cm}^3$$

- (b) Find the capacity of this cylinder to the nearest litre.

1

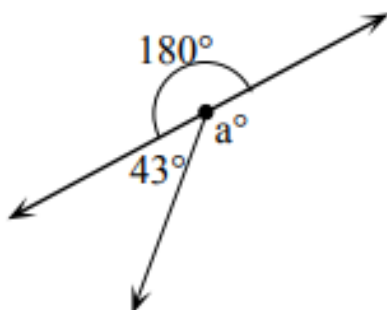
$$C = 9048 \text{ mL}$$

$$= 9 \text{ L (to nearest L)}$$

Question 10

Find the value of the pronumeral a , giving reasons.

2

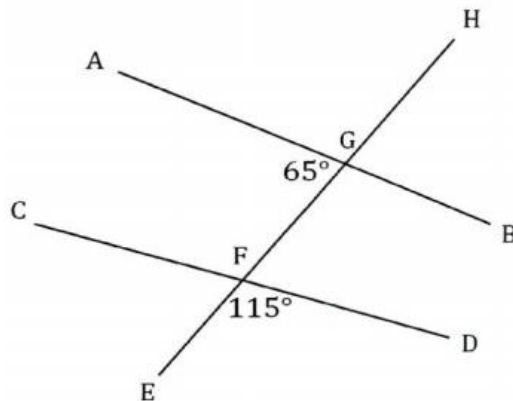


$$a = 360 - (43 + 180) \text{ (revolution = } 360^\circ)$$

$$= 137$$

Question 11**Marks**

Are the following lines, AB and CD, parallel? Give reasons for your answer.

2

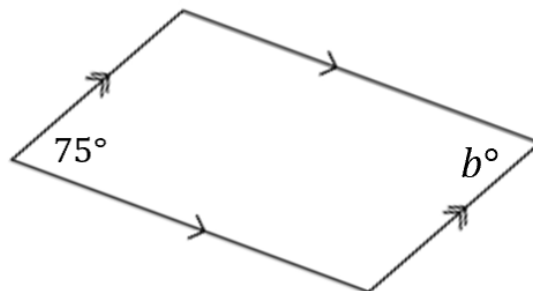
$\angle CFG = 115^\circ$ (vertically opposite)

$\angle CFG$ and $\angle AGF$ are co-interior $\angle$ s and supplementary

$\therefore AB \parallel CD$

Question 12

Find the value of the pronumeral in the diagram below, giving reasons.

2

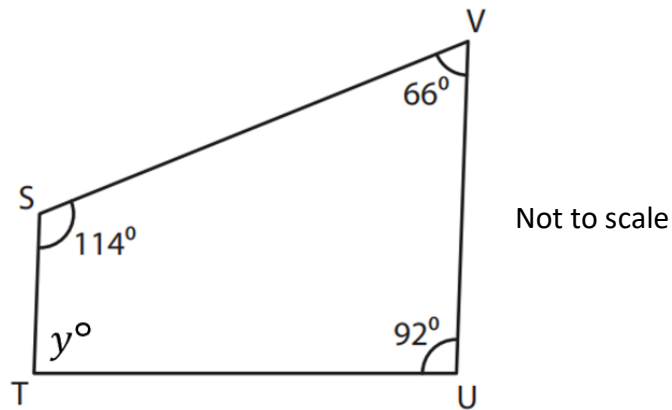
$b = 75^\circ$ (opposite $\angle$ s in parallelogram are equal)

Question 13

Marks

Find the value of the pronumeral y , giving reasons for your answer.

1



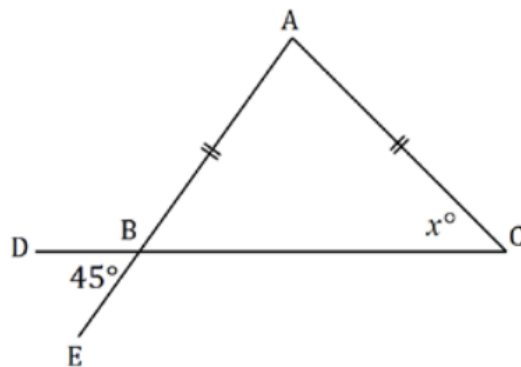
$$y = 360 - (114 + 66 + 92) \quad (\angle \text{sum of quadrilateral} = 360^\circ)$$

$$= 88$$

Question 14

Find the value of the pronumeral in the diagram below, giving reasons.

2



$$\angle ABC = 45^\circ \quad (\text{vertically opposite})$$

$$x = 45 \quad (\text{isosceles } \triangle)$$

Question 15

Marks

State the name of the quadrilateral that best matches these clues:

1

I have two pairs of equal sides. These sides are not opposite to each other.
Which quadrilateral am I?

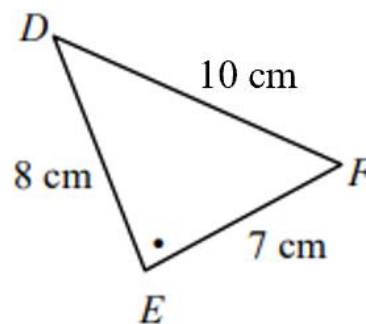
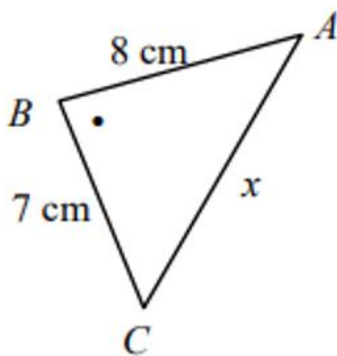
kite



Question 16

not in exam

Consider the following pair of congruent triangles.



- (a) Which test can be used to show $\triangle ABC \equiv \triangle DEF$?

1

SAS

- (b) Find the value of x .

1

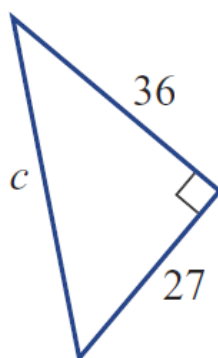
$x = 10$

Question 17

Marks

Calculate the length of the hypotenuse (c) in this triangle.

2



$$c^2 = 27^2 + 36^2$$

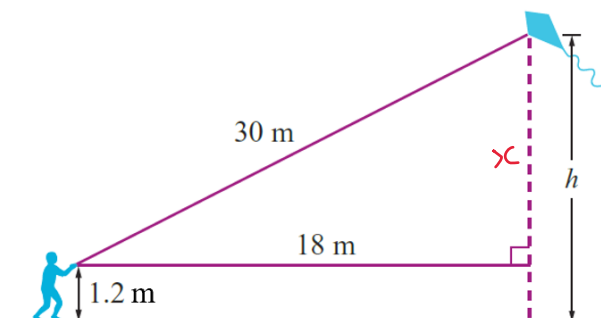
$$= 2025$$

$$c = 45$$

Question 18

Oliver holds the end of the string of a kite 1.2m above the ground. The string is 30 m long and the horizontal distance to the kite is 18 m. Find the height of the kite above the ground (h).

2



$$x^2 = 30^2 - 18^2$$

$$= 900 - 324$$

$$= 576$$

$$x = 24$$

$$h = 24 + 1.2$$

$$= 25.2$$

END OF PAPER

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Part 3 Statistics and Probability		Marks
MA4-19SP	Collects, represents and interprets single sets of data, using appropriate statistical displays	/7
MA4-20SP	Analyses single sets of data using measures of location, and range	/10
MA4-21SP	Represents probabilities of simple and compound events	/13
TOTAL:		/30

Question 1**Marks**

Give an example of categorical data.

1

Question 2

Andy is investigating the height of Year 8 students at CTHS. If he collected the height of every Year 8 student at CTHS, would this be considered to be a sample or census?

1

Question 3

A bar graph is drawn to represent the information in the table below. The table shows the number of different coloured cars parked on Purchase Rd.
The bar graph is 12 centimetres long.

Red	Silver	Black	White	Blue
7	12	9	8	4

(a) What is the total number of cars parked on Purchase Rd?

1

(b) Calculate the length of the section that represents the number of black cars.

1

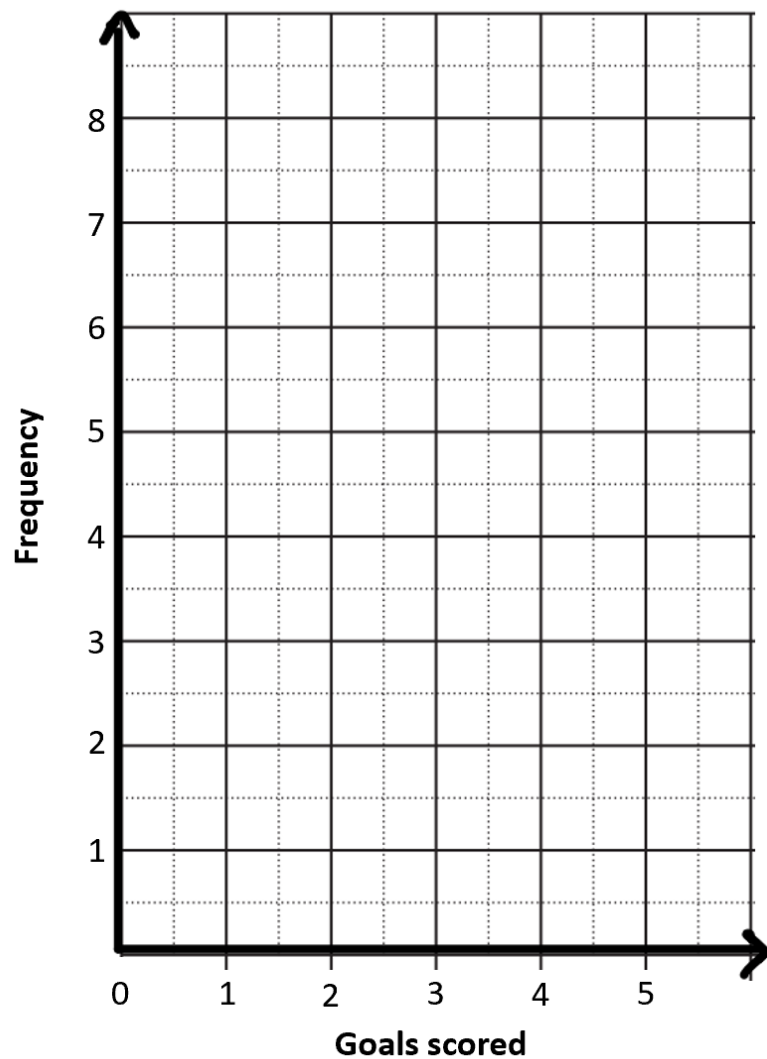
Question 4**Marks**

Warren compiled the frequency table below, based on the number of goals scored by his football team in each match.

3

Draw a frequency histogram and polygon for this data.

Goals scored by a football team	
Score (x)	Frequency (f)
1	3
2	8
3	6
4	5
5	4



Question 5**Marks**

The employees in a store earned the following wages in a week:

\$450 \$520 \$610 \$230 \$900 \$450 \$590

- (a) What is the mean wage? **1**

- (b) Which wage would be considered to be the mode? **1**

- (c) Which wage would be considered an outlier? **1**

Question 6

The following stem and leaf plot shows the heights, in centimetres, of the children in a day care centre.

Stem	Leaf
8	0 0 3 5 7 8 9
9	1 2 2 2 5 7
10	4 5
11	8

- (a) How many children are in the day care centre? **1**

- (b) What is the range of these heights? **1**

- (c) What is the median height? **1**

Question 7**Marks**

Complete the table below and find the mean, correct to one decimal place.

2

Scores (x)	Frequency (f)	fx
4	8	
5	12	
6	5	
7	4	
Total		

Question 8

Daniel wishes to end the year with a mean mark of at least 90%. He has averaged 88.5% in the first four exams this year. What is the lowest mark that Daniel can receive in the fifth exam if he wishes to reach his goal?

2

Question 9

The probability of winning a lottery is $\frac{1}{100}$. What is the probability of not winning?

1

Question 10**Marks**

Write an example where the probability of an event happening is an even chance.

1

Question 11

Fernando rolls a regular 6-sided die.



- (a) List the sample space if the die is rolled once.

1

- (b) What is the probability that Fernando rolls a 6?

1

- (c) What is the probability of rolling a number greater than 4?

1

Question 12

A bag contains 5 yellow marbles, 4 black marbles and 3 red marbles. One marble is drawn from the bag.

- (a) What is the probability of drawing a yellow marble?

1

- (b) What is the probability of drawing either a red or a yellow marble?

1

Question 13**Marks**

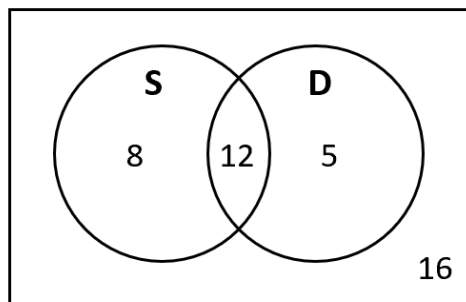
The table below shows a comparison between gender and dominant hand of a group of Year 8 students.

	Male	Female	Total
Left-handed	14	18	
Right-handed	86	65	
Total			183

- (a) Complete the table. 2
- (b) If a male student is selected, what is the probability that they will be left-handed? 1
-
- (c) What is the probability of selecting a female or a right-handed student? 1
-

Question 14

The Venn diagram below shows the number of students taking part in a school play who sing and/or dance.



- (a) What is the probability that a student in the play sings or dances, but not both? 1
-
- (b) What is the probability that a student will only sing in the play? 1
-

END OF PAPER