

Teacher Initials: _____

Name: _____



HYB JWH
BHC AYG
AXD JAI*
WMD LZM
GPF RJW

Tuesday, 17th November 2020
8:30am
2 hours
250 copies

Year 10

5.3 MATHEMATICS

Semester 2 Exam

General Instructions

- Write your name in the spaces provided
- Write using blue or black pen
- Answer in the spaces provided
- NESA approved calculators may be used
- Show ALL necessary working
- Diagrams are NOT to scale
- Marks may not be awarded for careless or poorly arranged working
- A reference sheet is attached to the end of this paper, which may be detached.

Section	Marks
Part A – Common Section Total	/43
Part B – 5.3 Only Section Total	/99
Q18 Surds and Indices	/7
Q19 Interest and Depreciation	/6
Q20 Graphs	/9
Q21 Quadratic Equations and Parabolas	/13
Q22 Coordinate Geometry	/9
Q23 Trigonometry and Geometry	/16
Q24 Simultaneous Equations and Inequalities	/6
Q25 Probability	/4
Q26 Analysing Data	/14
Q27 Logarithms	/9
Q28 Mixed Questions	/6
Exam Total:	/142

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Part A: Common Section (43 marks)

1. Simplify $7x^2 + 5x - 2x - 2x^2$ (1)

2. Simplify $m^5 \times 5m^2$ (1)

3. Solve for the value of x :

$$\frac{2x}{5} = 8 \quad (2)$$

4. A retail assistant earns \$12 per hour for a 20 hour working week, and double time for any additional hours worked.

Calculate the retail assistant's wage in a week where he works 30 hours. (2)

5. Sam invested \$2500 for 4 years in a savings account that earns simple interest at a rate of 2% per annum.

i) Calculate the total interest earned on the investment. (2)

ii) Find the total value of the investment after 4 years. (1)

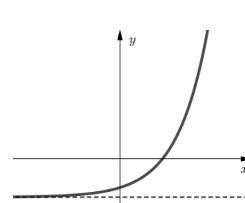
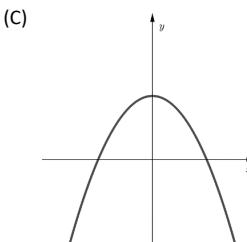
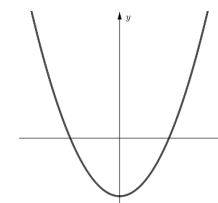
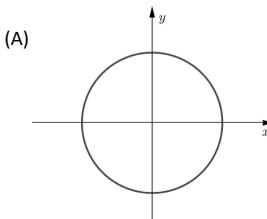
6. In a standard deck of 52 cards, there are four suits: Diamonds, Clubs, Hearts and Spades. There is an Ace in each suit.

If a card is chosen at random:

i) What is the probability that it is an Ace of Hearts or an Ace of Diamonds? Express your answer as a simplified fraction. (2)

ii) What is the probability that it is NOT an Ace? Express your answer as a simplified fraction. (1)

7. Which of the following could be the graph of $y = x^2 - 4$? (1)



8. Expand $-4m(m - 3)$ (2)

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9. Solve for the value of x :

$$2(3x - 1) = -8$$

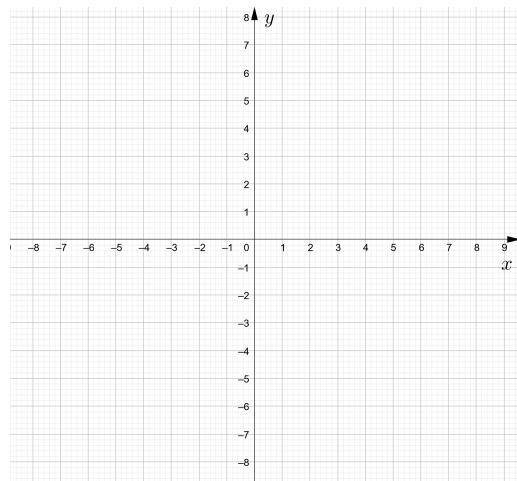
(2)

10. A straight line has the equation $y = 2x - 3$.

- i) Complete the table of values for the equation $y = 2x - 3$. (2)

x	-2	-1	2	5
y				

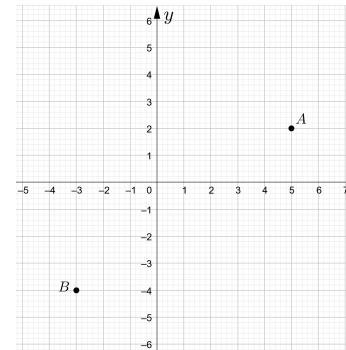
- ii) Use the table of values to graph the line on the coordinate plane. (1)



- iii) What feature of the straight line graph does the point $(0, -3)$ represent? (1)

- iv) If the line $y = 2x - 3$ is shifted up 6 units, what will be the equation of the new line? (1)

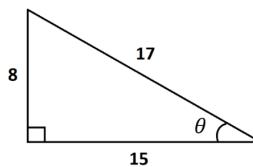
11. Two points A and B have the coordinates $A(5, 2)$ and $B(-3, -4)$ as shown.



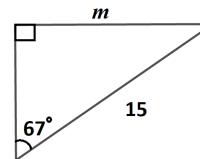
- i) Find the coordinates of the midpoint of A and B . (2)

- ii) State the coordinates of a point C such that $\triangle ABC$ is a right-angled triangle with the right angle occurring at vertex C . (1)

12. In the triangle below, find the value of $\tan \theta$ as a fraction. (1)



13. Find the length of the missing side in the following triangle. Round your answer to 2 decimal places. (2)



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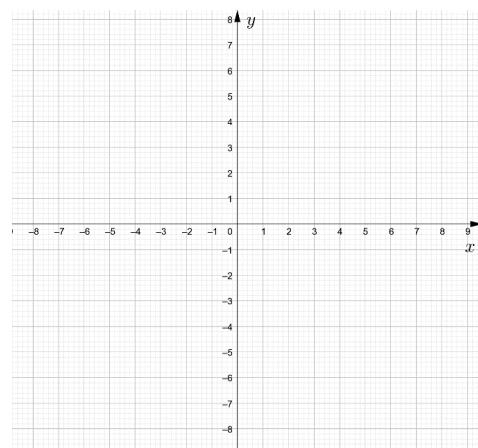
14. There are eight Barker buses that transport students to school along various routes. The distances of each route to the nearest kilometre are:

33, 25, 27, 17, 23, 20, 32, 17

- i) What is the mean distance of the routes? (1)
- ii) What is the median distance of the routes? (1)
- iii) What is the mode distance? (1)
- iv) If a ninth route were introduced that covers a distance of 19km, describe the effect this would have on the mean distance across all routes. (1)

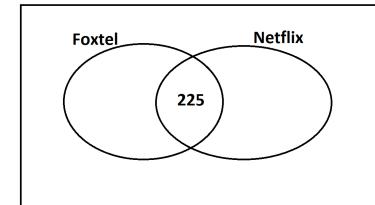
15. A circle has the equation $x^2 + y^2 = 16$.

- i) State the radius of the circle. (1)
- ii) Graph the circle on the coordinate plane, clearly marking the coordinates of any TWO points on the circle. (2)



16. A marketing company wants to see how popular Foxtel and Netflix are among Australians. In a survey of 1000 people, 415 people had Foxtel subscriptions, 621 people had Netflix subscriptions, and 225 people had subscriptions to both Netflix and Foxtel.

- i) The incomplete Venn diagram below shows the results of the survey.



Complete the Venn diagram using the information provided. (3)

- ii) Based on the results of the survey, if someone has a Netflix subscription, what is the probability that they also have a Foxtel subscription? (2)

17. The formulas for the circumference C and area A of a circle are:

$$C = \pi d \quad \text{where } d \text{ is the diameter.}$$
$$A = \pi r^2 \quad \text{where } r \text{ is the radius.}$$

Find the radius of a circle whose area is five times its circumference. (3)

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End of Part A

PART B 5.3 Only

Question 18 Surds and Indices (7 marks)

Marks

- a) Rationalise the denominator of $\frac{\sqrt{5}+3}{2\sqrt{2}}$

2

- b) Simplify $\sqrt{18} + 6\sqrt{2} - 2\sqrt{8}$

2

- c) Simplify $\frac{5x^4y^{-2}}{4z^2} \div \frac{2x^{-2}z^{-3}}{16y^6}$

3

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Name: _____ Marks _____

Question 19 Interest and Depreciation (6 marks)

- a) Jamie bought tools for work valued at **\$3200**. After 2 years Jamie wants to sell the tools. How much will the tools be worth at the time Jamie wants to sell if they depreciate at a rate of **9.8%** p.a.?

2

- b) George bought a TV valued at **\$4500**. He paid a **25%** deposit and took out a loan for the remaining amount. The loan has a flat rate of interest of **12.5%** p.a. to be paid off in equal monthly installments. If George wants to pay off the TV in 24 months, how much will he need to pay each month?

4

Question 20 Graphs (9 marks)

- a) The time (T) it takes to paint a fence is inversely proportional to the number of people (P) working.

i) Write an inverse proportion equation with k as the constant of variation. 1

ii) Find the value of k if it takes 12 hours for 3 people to paint the fence. 1

iii) How many people would be needed to paint the fence in less than 5 hours? 1

iv) What type of graph would your equation in part i) be? 1

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b) Consider the equation $y = 2^x - 3$.

i) What type of curve is this?

1

ii) What is the y -intercept?

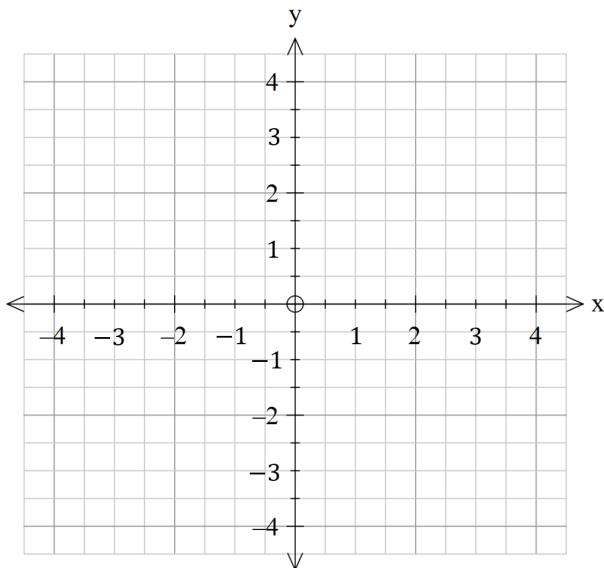
1

iii) What is the equation of the asymptote?

1

iv) Given that the x -intercept is approximately 1.6, graph the equation showing the above information.

2



Question 21 Quadratic Equations and Parabolas (13 marks)

Marks

a) Solve $6x^2 + 11x - 10 = 0$ by factorising.

3

b) Solve $7x^2 - 8x + 2 = 0$ by using the **quadratic formula**. Leave your answer in simplified surd form.

3

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- c) Consider the parabola $y = x^2 - 2x - 3$

i) Find the x - and y -intercepts of the parabola.

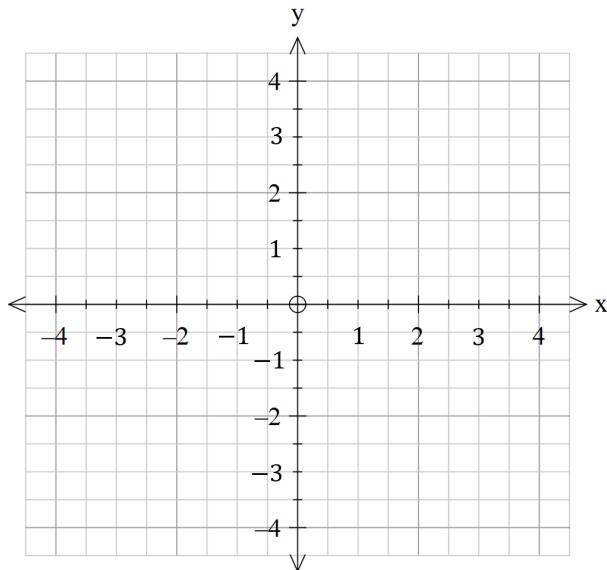
3

ii) Find the vertex of the parabola.

2

iii) Graph the parabola showing the above information and the axis of symmetry.

2



Question 22 Coordinate Geometry (9 marks)

Marks

- a) Use the point-gradient formula to find the equation of the line between the points $X(-7, 6)$ and $Y(1, -3)$. Write your answer in **general form**.

3

- b) The distance between two points $P(5, -1)$ and $Q(-3, y)$ is $\sqrt{80}$. Find the possible values of y .

3

- c) Two lines, p and q , are perpendicular and intersect at the point $(-3, 3)$.

Line p has a y -intercept of -5 .

Find the x -intercept of line q .

3

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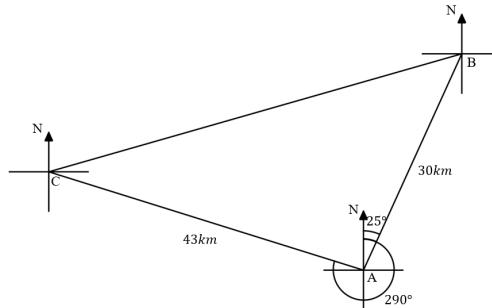
Name: _____

Question 23 Trigonometry and Geometry (16 marks)

Marks

- a) Bronte leaves town A and drives for **30km** on a bearing of **025°** to town B.

Charlie also leaves town A and drives for **43km** on a bearing of **290°** to town C.



- i) Find the size of $\angle BAC$. Reasons are not required.

1

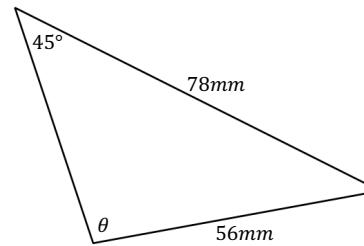
- ii) Calculate the distance between town B and town C. Round your answer to the nearest km. 3

- iii) Calculate the area of land enclosed by towns A, B and C correct to 1 decimal place.

2

- b) Given that θ is obtuse, find the value of θ to the nearest degree.

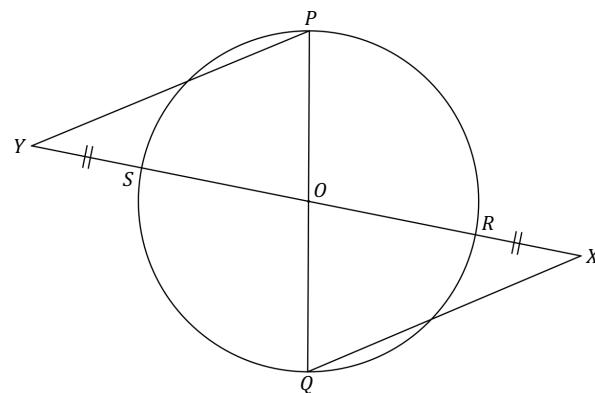
3



- c) In the following diagram O is the centre of the circle and P, Q, R and S lie on the circumference of the circle. OR and OS are extended to X and Y respectively such that $SY = RX$.

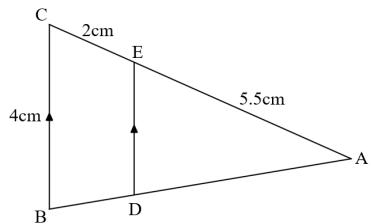
Prove that $\triangle POY \equiv \triangle QOX$.

3



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- d) In $\triangle ABC$ and $\triangle ADE$, AE is 5.5cm, EC is 2cm and BC is 4cm.



- i) Prove $\triangle ABC$ is similar to $\triangle ADE$.

2

- ii) Find the length of DE to 1 decimal place.

2

Question 24 Simultaneous Equations and Inequalities (6 marks)

- a) Solve the following pair of equations simultaneously.

$$3x - 6y = 18$$

$$-x + 4y = -2$$

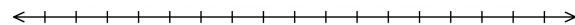
Marks

3

- b) Solve the following inequality and graph the result on the number line.

$$\frac{3x}{2} - \frac{2x+5}{3} < \frac{8-x}{6}$$

3



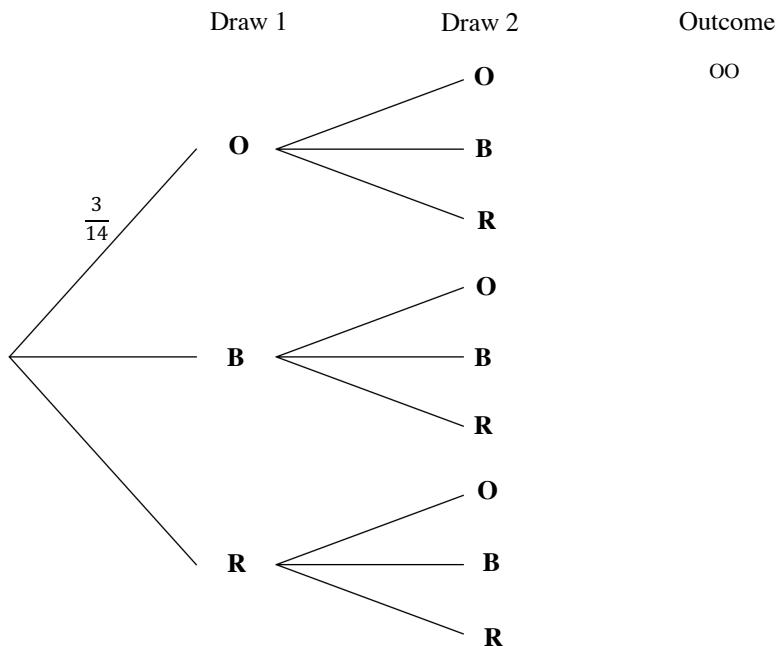
Teacher Initials: _____

Name: _____ Marks _____

Question 25 Probability (4 marks)

- a) A bag contains 3 orange, 7 blue and 4 red lollies. Jess selects two lollies at random without replacement.

- i) Complete the following probability tree diagram by writing the probabilities on each branch and the outcomes.



- ii) Jess does not like orange lollies. What is the probability that she selects two lollies that she does like?

2

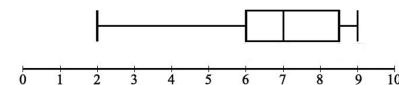
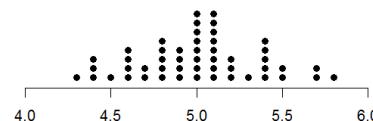
- i) Complete the following probability tree diagram by writing the probabilities on each branch and the outcomes.

2

Question 26 Analysing Data (14 marks)

Marks _____

- a) Describe each of the following sets of data as symmetrical, positively skewed or negatively skewed.



- b) The number of goals per game for two soccer teams are shown below.

Red team: 0 3 2 2 1 0 4 1 1

Blue team: 3 3 4 1 5 2 1 4 4

- i) Complete the five number summary for the red team.

3

Lowest score: _____

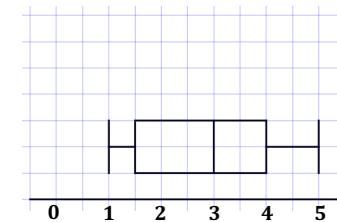
Q1: _____

Median: _____

Q3: _____

Highest score: _____

- ii) Complete the parallel box-and-whisker plot below by plotting the data for the red team.



- iii) Find the standard deviation for the Red Team to complete the following table.

1

Data	Red Team	Blue Team
Range	4	4
IQR	2	2.5
Standard Deviation		1.333

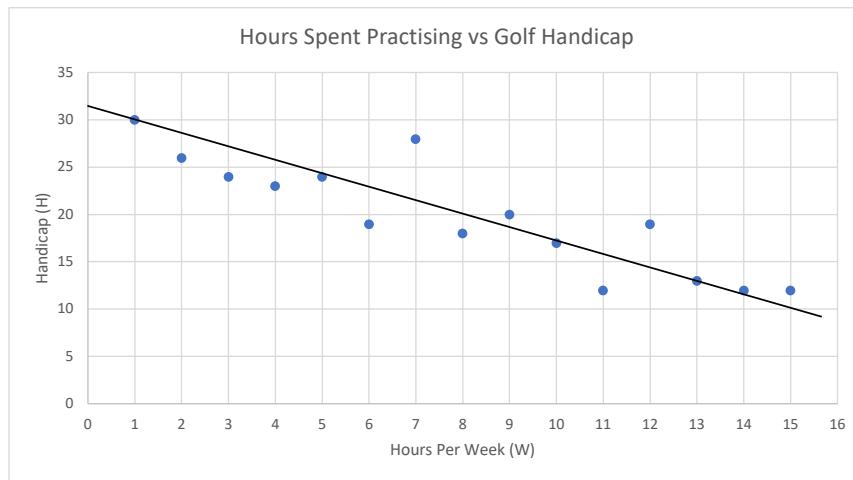
- iv) Which team do you think was more consistent? Justify your answer by referring to the range, interquartile range and standard deviation.

2

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- c) The graph below shows the correlation between the number of hours per week a person practises golf and their golf handicap.



- i) Write down the equation of the line of best fit on the above graph. Use H for handicap and W for hours per week. 2

- ii) Use your equation to determine how many hours of practise per week you would expect from someone with a handicap of 15. 2

Question 27 Logarithms (9 marks)

- a) Write $4^x = 256$ in logarithmic form. 1

- b) Evaluate $\log_3 216 - (\log_3 2 + \log_3 4)$ using the log laws. 3

- c) Solve $15\log_m 16 = 60$ 2

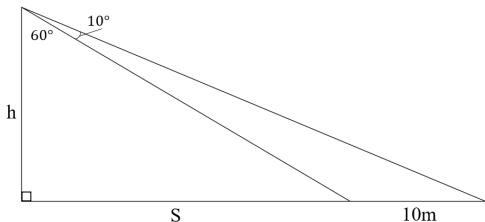
- d) Andrew invests \$50,000 into a savings account that earns an interest rate of 9.4% p.a. compounding quarterly. How long will it take in years for Andrew's investment to double? 3

Teacher Initials: _____

Name: _____ Marks _____

Question 28 Mixed Questions (6 marks)

- a) The shadow (s) of a building increases by 10m when the angle of the sun from the top of the building to the ground increases by 10° . Find the height (h) of the building to 1 decimal place. 3



- b) Consider the line $y = -2x + b$ and the parabola $y = (x - 1)^2 - 5$.

A value for b is selected at random where b is an integer (whole number) satisfying $0 \leq b \leq 15$. What is the exact probability that the value selected for b will have the line intersecting the parabola above the x -axis only? 3

END OF PAPER

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YEAR 10 - FORMULA SHEET**Simple Interest**

$$I = Prn$$

- P is initial amount
 r is interest rate per period, expressed as a decimal
 n is number of periods

Compound Interest

$$A = P(1 + r)^n$$

- A is final amount
 P is initial amount
 r is interest rate per period, expressed as a decimal
 n is number of compounding periods

Depreciation

$$A = P(1 - r)^n$$

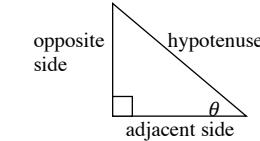
- A is final value of asset after n periods
 P is initial value of asset
 r is depreciation rate per period,

Point-gradient of the equation of a line

$$y - y_1 = m(x - x_1)$$

Solution of a quadratic equation

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Trigonometric Ratios

$$\sin \theta = \frac{\text{opposite side}}{\text{hypotenuse}}$$

$$\cos \theta = \frac{\text{adjacent side}}{\text{hypotenuse}}$$

$$\tan \theta = \frac{\text{opposite side}}{\text{adjacent side}}$$

Sine ruleIn ΔABC

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

Cosine RuleIn ΔABC

$$c^2 = a^2 + b^2 - 2ab \cos C$$

or

$$\cos C = \frac{a^2 + b^2 - c^2}{2ab}$$

Area of a triangleIn ΔABC

$$A = \frac{1}{2}ab \sin C$$

Gradient-intercept form of a line

$$y = mx + b$$

- m is gradient
 b is y-intercept

Slope (gradient) of a line

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Distance between two points

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Midpoint between two points

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

Teacher Initials: _____
Circumference of a circle

$$C = 2\pi r \text{ or } C = \pi D$$

r is radius
 D is diameter

Area

Circle

$$A = \pi r^2$$

r is radius

Sector

$$A = \frac{\theta}{360} \pi r^2$$

r is radius
 θ is number of degrees in central angle

Annulus

$$A = \pi(R^2 - r^2)$$

R is radius of outer circle
 r is radius of inner circle

Trapezium

$$A = \frac{h}{2}(a + b)$$

h is perpendicular height
 a and b are the lengths of the parallel sides

Name: _____
Surface Area

Sphere

$$A = 4\pi r^2$$

r is radius

Closed cylinder

$$A = 2\pi r^2 + 2\pi rh$$

r is radius
 h is perpendicular height

Volume

Prism or cylinder

$$V = Ah$$

A is area of base
 h is perpendicular height

Pyramid or cone

$$V = \frac{1}{3}Ah$$

A is area of base
 h is perpendicular height

Volume and capacity

Unit conversion: $1 \text{ m}^3 = 1000 \text{ L}$

Year 10 Final Examination Common

1. $5x^2 + 3x$

2. $5m^7$

3. $2x = 40$
 $x = 20$

4. total = $10 \times (2 + 12) + 20 \times 12$
 $= \$480$

5(i) $I = 2500 \times 0.02 \times 4$
 $= 200$

5(ii) \$2700

6(i) $\frac{1}{26}$

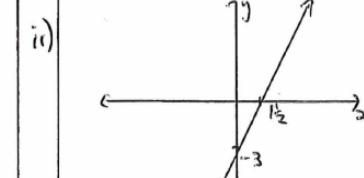
6(ii) $\frac{12}{13}$

7. B

8. $-4m^2 + 12m$

9. $6x - 2 = -8$
 $6x = -6$
 $x = -1$

10(i) $\begin{array}{r|rrrrr} x & -2 & -1 & 2 & 5 \\ \hline y & -7 & -5 & 1 & 7 \end{array}$



10(iii) y -intercept

10(iv) $y = 2x + 3$

11(i) $(1, -1)$

11(ii) $(5, -4)$ or $(-3, 2)$

12. $\tan \theta = \frac{8}{15}$

13. $\sin 67 = \frac{m}{15}$

$m = 15 \sin 67$
 $m = 13.81 \text{ (2dp)}$

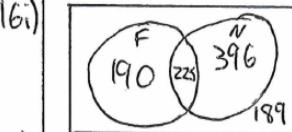
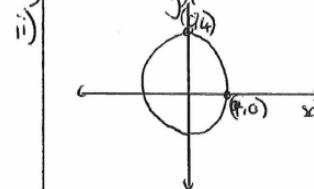
14. 24.25

15. 24

16. 17

17. Lower the mean

18. $r = 4$



20. $\frac{225}{625} = \frac{25}{69}$

21. $\pi r^2 = 5(2\pi r)$

$\pi r^2 = 10\pi r$

$r = 10 \text{ cm}$

PART B

Q.N. 18

$$\text{a) } \frac{\sqrt{5}+3}{2\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} =$$

$$\frac{\sqrt{10}+3\sqrt{2}}{4}$$

$$\text{(b) Either: } \text{Loan value} = \$4500 \times 0.75$$

$$3\sqrt{2} + 6\sqrt{2} - 4\sqrt{2} = \$3375$$

$$\text{or Deposit} = \$4500 \times 0.25$$

$$= \$1125$$

$$\text{(c) } \frac{5x^4y^{-2}}{4z^2} \times \frac{x^6y^6}{2x^{-2}z^{-3}} = \text{Loan value} = \$4500 - \$1125$$

$$= \$3375$$

$$\frac{20x^4y^4}{2x^{-2}z^{-1}} = \frac{20x^6y^4}{2z^{-1}}$$

$$= 10x^6y^4z$$

Q.N. 19

Either

$$S = \$3200(1-0.098)^2$$

$$= \$2603.53$$

$$\text{Interest on loan} = \$3375 \times 0.125 \times 2$$

$$= \$843.75$$

$$\text{Balance outstanding} = \$3375 + \\ \$843.75 \\ \$4218.75$$

$$\text{Monthly instalment} = \$4218.75$$

24 months

$$= \$175.78125$$

$$= \$175.79$$

OR

$$S_1 = \$3200 \times 0.902$$

$$= \$2886.4$$

$$S_2 = \$2886.4 \times 0.902$$

$$= \$2603.53$$

Q.N. 20

$$\text{(a) (i) Either } T = \frac{K}{P}$$

$$\text{or } P = \frac{K}{T}$$

$$\text{(ii) } 12 = \frac{K}{3}$$

$$K = 36$$

$$\text{(iii) Either } 5 = \frac{36}{P}$$

$$P = 7.2$$

so 8 people needed

$$\text{or } P = \frac{36}{5}$$

$$P = 7.2$$

P = 8 people needed.

Q.N. 21

$$\text{(a) product} = -60 \quad \begin{cases} \text{factors are} \\ \text{sum} = +11 \end{cases} \quad \begin{cases} +15 \text{ and } -4 \\ +10 \text{ and } -6 \end{cases}$$

$$6x^2 - 4x + 15x - 10 = 0$$

Grouping in pairs gives

$$2x(3x-2) + 5(3x-2) = 0$$

$$(2x+5)(3x-2) = 0$$

$$\text{Either } (2x+5) = 0 \rightarrow x = \frac{-5}{2}$$

$$\text{or } (3x-2) = 0 \rightarrow x = \frac{2}{3}$$

$$\text{(b) here } a = 7, b = -8, c = +2$$

$$x = \frac{+8 \pm \sqrt{64 - 4(7)(2)}}{14}$$

$$x = \frac{+8 \pm \sqrt{8}}{14}$$

$$x = \frac{+8 \pm 2\sqrt{2}}{14}$$

$$x = \frac{2(4 \pm \sqrt{2})}{2(7)}$$

(iv) Hyperbola

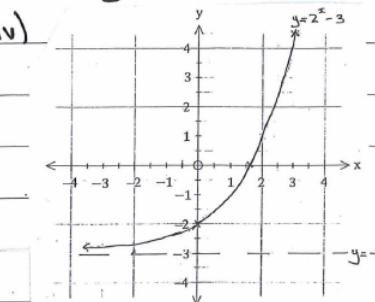
(b) (i) Exponential

(ii) when $x=0$,

$$y = -2 \quad (0, -2)$$

(iii) $y = -3$

(iv)



$$x = 4 \pm \sqrt{2}$$

(c) For x intercepts, let $y = 0$

$$0 = x^2 - 2x - 3$$

$$0 = (x-3)(x+1)$$

$$\text{Either } (x-3) = 0 \rightarrow x = 3 \quad (3, 0)$$

$$\text{or } (x+1) = 0 \rightarrow x = -1 \quad (-1, 0)$$

For y intercept, let $x=0$

$$y=-3 \rightarrow (0, -3)$$

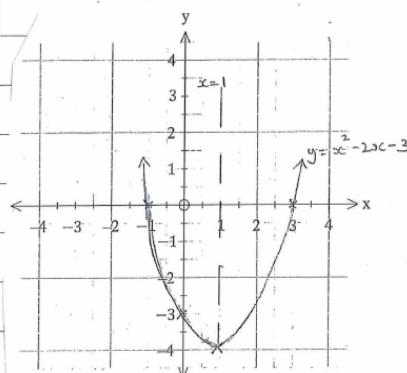
$$(ii) Axis of symmetry (oc) = \frac{-b}{2a}$$

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

$$oc = 1$$

$$\text{when } x=1, y=-4$$

$$\text{Vertex at } (1, -4)$$



Qn. 22

$$(a) m = \frac{-3-6}{1+7}$$

$$m = \frac{-9}{8}$$

Using $(-7, 6)$ as (x_1, y_1)

$$y-6 = \frac{-9}{8}(x+7)$$

$$8y-48 = -9x-63$$

$$9x+8y+15=0$$

$$(b) \sqrt{80} = \sqrt{(5+3)^2 + (-1-y)^2}$$

$$80 = y^2 + 2y + 65$$

$$0 = y^2 + 2y - 15$$

$$0 = (y+5)(y-3)$$

Either

$$y+5=0 \rightarrow y=-5$$

$$\text{or } y-3=0 \rightarrow y=3$$

Possible values of y are -5 and 3

(c)

$$\text{Gradient of line } p = \frac{-5-3}{0+3} = \frac{-8}{3}$$

For perpendicularity, gradient of line $q = \frac{3}{8}$

$$\text{line } q = \frac{3}{8}x + b$$

Substituting $(-3, 3)$ gives

$$3 = \frac{3}{8}(-3) + b$$

$$b = \frac{33}{8}$$

$$\text{Equation of line } q \text{ is } y = \frac{3}{8}x + \frac{33}{8}$$

For xc intercept, let $y=0$

$$0 = \frac{3}{8}x + \frac{33}{8}$$

$$x = -11$$

so xc intercepts at $(-11, 0)$

Qn. 23

$$(a) (i) \angle WAN = 360^\circ - 290^\circ$$

$$= 70^\circ$$

$$\angle BAC = 70^\circ + 25^\circ$$

$$= 95^\circ$$

$$(ii) \frac{DE}{4} = \frac{5.5}{7.5}$$

$$DE = 2.93$$

$$DE = 2.9 \text{ cm (to 1 d.p.)}$$

$$(ii) a^2 = 30^2 + 43^2 - 2(30)(43)\cos 95^\circ$$

$$a = 54.533 \dots \text{ km}$$

$$a = 55 \text{ km (to nearest km)}$$

$$(iii) A = \frac{1}{2}(30)(43)\sin 95^\circ$$

$$A = 642.545 \dots \text{ km}^2$$

$$A = 642.5 \text{ km}^2 (\text{to 1 d.p.})$$

Qn 24 (a)

Either:

Substitute $x = 4y+2$ into $3x-6y=18$

$$3(4y+2) - 6y = 18$$

$$(b) \frac{\sin \theta}{78} = \frac{\sin 45}{56}$$

$$6y = 12$$

$$y = 2$$

Substituting $y=2$ into $3x-6y=18$

$$3x-12 = 18$$

$$x = 10$$

Solutions are $x = 10, y = 2$

Or by elimination:

$$3x-6y = 18$$

$$(c) \angle POS = \angle QOR (\text{vert. opp. l's})$$

$$OP = OQ (\text{radii of circle})$$

$$OY = OX (\text{OS} = OR \text{ (radii)})$$

$$SY = RX (\text{data})$$

$$\triangle POY \cong \triangle QOX (\text{SAS})$$

$$-x + 4y = -2 \quad (\times 3)$$

$$3x - 6y = 18 \quad +$$

$$-3x + 12y = -6$$

$$6y = 12$$

$$y = 2$$

(d) (i) $\angle A$ is common

$$\angle CBA = \angle EDA (\text{corr. l's; BC} \parallel DE)$$

When $y=2, 3x-6y=18$ becomes

$$3x-12 = 18$$

$$x = 10$$

$\therefore \triangle ABC \sim \triangle ADE$ (Equiangular)

Solutions are $x = 10, y = 2$

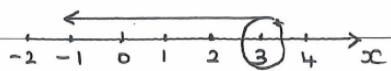
$$(b) \frac{9x}{6} - \frac{4x+10}{6} < \frac{8-x}{6}$$

$$9x - 4x - 10 < 8 - x$$

$$5x - 10 < 8 - x$$

$$6x < 18$$

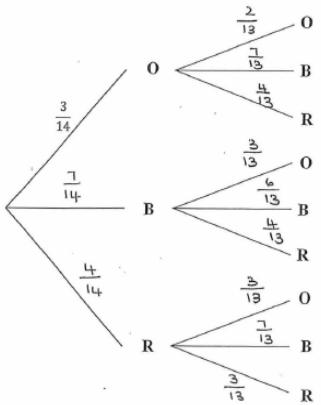
$$x < 3$$



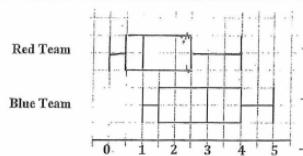
QN 25

(a) (i)

Draw 1 Draw 2 Outcome



(ii)



(iii)

$$\text{standard deviation} = 1.257$$

$$\text{or sample standard dev} = 1.3$$

(iv) Red team is more consistent; smaller IQR and smaller standard dev.

Same range

$$(ii) p(BB) + p(BR) + p(RB) + p(RR) =$$

$$\left(\frac{7}{14} \times \frac{6}{13}\right) + \left(\frac{7}{14} \times \frac{4}{13}\right) + \left(\frac{4}{14} \times \frac{7}{13}\right) + \left(\frac{4}{14} \times \frac{3}{13}\right) =$$

$$\frac{55}{91}$$

$$\text{or } 0.60439 \dots =$$

$$\text{or } 60.439 \dots \%$$

$$m = \frac{-10}{7}$$

Point-gradient formula with (1, 30)

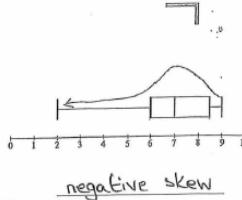
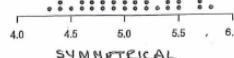
$$y - 30 = \frac{-10}{7}(x - 1)$$

$$7y = -10x + 220$$

$$H = \frac{-10}{7}W + \frac{220}{7}$$

QN 26

(a)



(b)

(i)

Lowest score:	0
Q1:	0.5
Median:	1
Q3:	2.5
Highest score:	4

negative skew

$$(ii) 15 = \frac{-10W}{7} + \frac{220}{7}$$

$$-115 = -\frac{10W}{7}$$

$$W = 11.5$$

$n = 7 \cdot 4602$ years

$n = 7 \cdot 5$ years

or 8 years

QN 28

$$(a) \tan 60^\circ = \frac{s}{h} \rightarrow h = \frac{s}{\tan 60^\circ}$$

$$\tan 70^\circ = \frac{s+10}{h} \text{ but } h = \frac{s}{\tan 60^\circ}$$

$$\tan 70^\circ = \frac{s+10}{\frac{s}{\tan 60^\circ}}$$

$$s \tan 70^\circ = (s+10) \tan 60^\circ$$

$$1.0155s = 17.32$$

$$s \approx 17 \text{ m}$$

$$\tan 60^\circ = \frac{\sqrt{3}}{h}$$

$$h = 9.8 \text{ m}$$

$$(b) \text{For } y = (x-1)^2 - 5, \text{ let } y = 0$$

$$0 = x^2 - 2x - 4$$

$$\text{here } a=1, b=-2, c=-4$$

$$x = 2 \pm \sqrt{4+16}$$

$$x = 3.236 \text{ or } -1.236$$

$$\text{when } x = 3.236, y = 0$$

$$0 = -2(3.236) + b$$

$$6.472 = b$$

$$b \geq 7$$

$$\text{when } x = -1.236, y = 0$$

$$0 = -2(-1.236) + b$$

$$-2.472 = b \quad \text{DISMISS } (0 \leq b \leq 15)$$

$$P(b \geq 7) = \frac{9}{16}$$

$$(d) 100000 = 50000 \left(1 + \frac{0.094}{4}\right)^n$$

$$2 = 1.0235^n$$

$$n = \log_{1.0235} 2$$

$$\log_{1.0235} 1.0235$$

$$n = 29.8408 \dots \text{ quarters}$$