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| High School | |
| Half -Yearly  Examination | |
| 2015  Year 10  Mathematics Course | |
| **General Instructions**   * Reading time: 5 minutes * Working time: 2 hours * There will be a short break between Section 1 and Section 2 * Write using black or blue pen * You may use a pencil to draw or complete diagrams * Attempt ALL questions * Approved calculators may be used in Section 2. * Write your Name and Teacher’s Name in the spaces provided. * A formula Sheet is on the reverse of this page and can be detached and used in all sections of the test. | **Total Marks – 100**  **Section 1**  Non Calculator Section.  **25 marks**  Time allowed for this section is 30 minutes.  Write all answers in the spaces provided.  **Section 2**  Time allowed for this section is 1 hour and 30 minutes.  **Part A**  Multiple Choice Section.  Mark your answers on the separate answer sheet at the end of the examination.  **50 marks**  **Part B**  Longer Answer Section.  Write all answers in the spaces provided.  **25 marks** |

Formula Sheet

**Pythagoras’ Theorem**



*c* = hypotenuse

*a* and *b* are the shorter sides

**Circumference of a circle**



*d* = diameter

**Area of a circle**



*r* = radius

**Area of a parallelogram**



*b* = base

*h* = perpendicular height

**Area of a rhombus or kite**



*x* and *y* are the diagonals

**Area of a trapezium**



*h* = perpendicular height

*a* and *b* are the parallel sides

**Volume of a prism**



*A* = area of base

*h* = perpendicular height

**Volume of a pyramid**



*A* = area of base

*h* = perpendicular height

**Volume of a cylinder**



*r* = radius

*h* = perpendicular height

**Volume of a cone**



**Volume of a sphere**



**Surface Area of a Cylinder**



**Surface Area of Cone**



*r* = radius

*l* = slant height

**Surface Area of a sphere**



**Trigonometric formulae for a triangle ABC.**

**Sine Rule**



**Cosine Rule**



or



**Area of a triangle**



**Simple interest**



*P* = Principal

*R* = interest rate per time period as a decimal

*T* = number of time periods

**Compound Interest**



*A =* Final amount to which the investment grows

*P* = Principal

*r* = interest rate per compounding period as a decimal

*n* = number of compounding periods

**Depreciation**



*SV =* Salvage Value to which the initial value falls

*IV* = Initial Value

*r* = depreciation rate per compounding period as a decimal

*n* = number of compounding periods

**Gradient of a line**



 and  are points on the line

*m* = gradient

**Midpoint of a line segment**



**Length of a line segment**



**Equation of a line**



or



*b* = *y* intercept

Half Yearly Examination

**Mathematics**

Class/Teacher \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Section 1**

**25 marks**

Time allowed for this section is 30 minutes

Answer Questions 1–25 in the spaces provided.

Calculators are **NOT** to be used in this section.

There will be a short break between Section 1 and Section 2.

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| **Section 1** Non Calculator Section | |
|  | Write all working and answers in the spaces provided on this test paper.  Diagrams are not to scale, unless otherwise stated. |
| 1. | Find the value of  …………………………………………………………………….………………………………..  ……………………………………………………………………………..……………….. |
| 2. | …………………………………………………………………….………………………………..  ……………………………………………………………………………..……………….. |
| 3. | In a bulk store, cereal costs $3.85 per kilogram.  Adrian buys 0.8 kg of this cereal.  What does it cost, to the nearest 5 cents?  …………………………………………………………………….………………………………..  ……………………………………………………………………………..……………….. |
| 4. | Zena works delivering catalogues.  On one weekend she earned $192.00 for delivering 800 catalogues.  How much was she paid for each catalogue that she delivered?  …………………………………………………………………….………………………………..  ……………………………………………………………………………..……………….. |
| 5. | Nathan buys a games console which is normally priced at $280, and is given a 30% discount.  How much does he pay for the console?  …………………………………………………………………….………………………………...  ……………………………………………………………………………..……………….. |
| 6. | Beau pays a photographer to take some portraits of his family.  The photographer charges $80 per hour plus 10% GST.  The photographer works for 2.5 hours to take the portraits.  What will Beau have to pay the photographer?  …………………………………………………………………….………………………………..  ……………………………………………………………………………..……………….. |
| 7. | In a gathering of company employees there are 6 accountants, 12 clerical assistants and 2 designers.  What is the ratio of clerical assistants to other employees? (Answer in simplest form.)  …………………………………………………………………….…………………………….…..  ……………………………………………………………………………..……………….. |
| 8. | What is the value of *x* in the diagram?  ………………………………………………  …………………….………………………..  ………………………………………………  ……………………………..……………….. |
| 9. | Which two words from those in the box could be used to describe  Acute Obtuse Right  Equilateral Isosceles Scalene  ………………………………………………  ……………………………..……………….. |
| 10. | The quadrilateral EFGH is a kite.  What is the size of  …………………………………………………..  ………………………….……………….………  ……………………………………………  ………………………..………………….. |
| 11. | A Cougar sedan is 3.2 metres in length.  A Cougar coupe is 40 cm shorter than the sedan.  How long is the coupe? (Answer to the nearest 10th of a metre)  …………………………………………………………………….…………………..…………..  ……………………………………………………………………………..……………….. |
| 12. | What is the perimeter of the polygon shown?  …………………………..…………………………  .……………………………………………………..  ………………………………………………  ……………………………..……………….. |
| 13. | A flag is in the shape of a triangle as shown.  What area of fabric is needed for the flag?  …………………………………………….……….  .…………………….……………………………….  ……………………………………………...  ……………………………..………………. |
| 14. | A concrete tile is in the shape of a rectangular prism with the dimensions shown.  How many cubic metres of concrete is needed to make 500 of these tiles?  (1 cubic metre = 1 000 000 cm3)  ………………………………………………  …………………….………………………..  ………………………………………………  …………………….……………………….. |
| 15. | Yvonne takes a shortcut along the path through the centre of the park from V to X.  How many metres does she save, compared to walking around the outside through W?  ……………………………..……………………….  .…………………… ………..…………………….  ……………………………………………...  ……………………………..………………. |
| 16. | Simplify  …………………………………………………………………….………………………………..  ……………………………………………………………………………..……………….. |
| 17. | Simplify  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. |
| 18. | Expand and simplify  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. |
| 19. | What is the midpoint of the interval joining the points *A*( , 4) and *B*( , ) on the number plane?  ……..……………………………………  ……………………………………………  ………………….………………………..  …………………………..……………….. |
| 20. | …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. |
| 21. | Find the value of *m* if  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. |
| 22. | In Jacks bag of marbles, there are 19 catseyes, 16 aggies and 5 glassies.  If Jack chooses one marble at random from his bag, what is the probability that it is an aggie?  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. |
| 23. | The heights (in metres) of a group of family members is listed below.  1.65, 0.95, 1.84, 1.32, 1.45, 0.87, 1.88, 1.24, 1.35, 1.75.  What is the median height of the group?  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. |
|  | **Questions 24 and 25 refer to the graph below.**    The Harriers Club holds a fete every two years. The graph shows the profit from the fete over a number of years. |
| 24. | Between which two years was the biggest increase in profit from one fete to the next?  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. |
| 25. | Mark will be in charge of the 2017 fete and he sets a goal of beating the current record profit by 10%.  To meet Marks Goal, how much more does the fete need to make in 2017, than it did in 2015?  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. |
|  | **End of Section 1** |

Half Yearly Examination

**Mathematics**

**Section 2**

**75 marks**

Time allowed for this section is

1 hour and 30 minutes

This section has TWO parts

Part A – Fifty multiple-choice questions worth 1 mark each.

Mark your answers on the separate answer sheet provided at the end of the examination.

Part B – Longer answer questions worth a total of 25 marks.

Write all answers and working in the spaces provided on this examination paper.

Calculators may be used in this section.

Do not commence Section 2 until you are instructed to do so.

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|  | **Section 2**  **Part A**  Multiple Choice Section |
|  | Use the multiple choice answer sheet at the end of the paper to record your answers.  Completely shade the bubble corresponding to the correct answer for each question. |
|  | Which of the following is not equivalent to  A.  B.  C. 0.65 D. |
|  | What is  A.  B. 78.75 kg C. 81 kg D. 82.5 kg |
|  | The ratio 200 m : 1.6 km is the same as :  A. 1 : 2 B. 1 : 4 C. 1 : 8 D. 1 : 16 |
|  | A bank offers 3% pa simple interest on term deposits.  How long would $800 need to be invested to earn $96 in interest?  A. 4 years B. 5 years C. 6 years D. 8 years |
|  | Charli buys jewellery for $25 per item and sells it at the weekend markets for $32 per item.  What percentage profit does she make on her cost price?  A. 21% B. 28%  C. 35% D. 56% |
|  | What is the value of *d* ?  NOT  TO  SCALE  A. 47 B. 72  C. 83 D. 108 |
|  | Which shape is a convex regular octagon?  A. B.  C. D. |
|  | The figure *PQRS* is rotated through 180o.  Which diagram could show the image?  A. B. C. D. |
|  | Find the value of *w*.  NOT  TO  SCALE    A. *w* = 25 B. *w* = 78  C. *w* = 102 D. *w* = 125 |
|  | Given that *AB* | | *DC* and *BC* | | *AD*, which statement is always true?  A. *AC* bisects *BD*  B. *AC* bisects *BCD*  C. *AC* is equal in length to *BD*  D. *AC* is perpendicular to *BD* |
|  | What is the area of the quadrilateral shown?  A. 240 cm2  B. 320 cm2  C. 384 cm2  D. 480 cm2 |
|  | Find the area of the shape shown  A. 900 cm2  B. 1 080 cm2  C. 1 180 cm2  D. 2 300 cm2 |
|  | A glass hexagon which has an area of 248 cm2 is used as the base of an aquarium.  The aquarium is in the shape of a prism which is 25 cm high.  What volume of water does it hold if filled to the top?  A. 3 100 cm2 B. 6 200 cm2  C. 9 600 cm2 D. 12 400 cm2 |
|  | Find the length of *AC* (correct to one decimal place).  A. 34.0 cm  B. 47.4 cm  C. 49.8 cm  D. 52.5 cm |
|  | What is the value of  in the triangle shown?  A.  B.  C.  D. |
|  | Given that  find the value of  A.  B.  C. 2 D. 10 |
|  | Which of these is not a factor of  A.  B.  C.  D. |
|  | What is the gradient of the line which passes through A (– 2, 8) and B (1, – 1).  A.  B.  C.  D. |
|  | Simplify  A.  B.  C.  D. |
|  | Which graph shows the solution set to    A.  B.  C.  D. |
|  | Questions 46 and 47 refer to the graph below. |
|  | How many of the eight games did the Eagles win (more points scored for than against)?  A. 4 B. 5 C. 6 D. 7 |
|  | Their coach made four statements to the Eagles.  Which one *isn’t true* based on the data in the graph?  A. “If you score less than 15 points you will lose more games than you win.”  B. “If you score more than 15 points you will always win.”  C. “If you score more than 15 points you will not lose.”  D. “You will always lose some games in a competition.” |
|  | What is the mean of the set of scores below?  11, 15, 25, 23, 16, 18, 26, 31, 14, 16.  A. 16 B. 17 C. 19.5 D. 20 |
|  | Questions 49 and 50 refer to the dot plot below.   |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  | ● |  |  |  |  |  |  |  |  | |  |  |  |  | ● | ● |  |  |  |  |  |  |  | |  |  |  | ● | ● | ● | ● |  |  |  |  | ● |  | |  |  |  | ● | ● | ● | ● | ● |  |  | ● | ● |  | |  |  | ● | ● | ● | ● | ● | ● | ● |  | ● | ● | ● | |  |  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | |
|  | What is the range of the scores in the plot?  A. 6 B. 8 C. 9 D. 10 |
|  | What is the mean of the scores?  A. 12.79 B. 13.6 C. 13.8 D. 14.24 |
|  | Which of the following is the prime factorisation of 540?  A.  B.  C.  D. |
|  | Xanthe is a salesperson who is paid a retainer of $700 per week plus 5% of her sales up to and including $4 000 and 2% of her sales over $4 000.  What would she earn in a week where her sales totalled $6 500?  A. $750 B. $850 C. $950 D. $1 050 |
|  | Liam buys a motorbike by paying a $750 deposit and making monthly payments of $281.25 for 4 years.  The cash price for the bike was $12 000.  How much interest did he pay in buying the bike this way?  A. $1 500 B. $1 750 C. $2 000 D. $2 250 |
|  | Dion borrows $3 250 from his parents and three years later he pays them back $3 835, which is the money he borrowed plus interest.  What annual rate of simple interest did he pay?  A. 5.5% B. 6.0% C. 6.5% D. 7.5% |
|  | Will has 63 pieces of clothing that he wants to donate to charity.  He gives them to Anglicare and Vinnies in the ratio 4 : 3.  How many pieces does Anglicare receive?  A. 9 pieces B. 18 pieces C. 27 pieces D. 36 pieces |
|  | Find the value of *q*.  NOT  TO  SCALE  A. *q* = 13 B. *q* = 48  C. *q* = 77 D. *q* = 103 |
|  | In the diagram which pair of triangles are **not** congruent?  A.  B.  C.  D. |
|  | In the diagram  A proof that *x* = 65 has been completed with no reasons provided.  Which of these reasons is not used in this proof?  A. Angle sum of a triangle.  B. Angle sum of a quadrilateral.  C. Base angles of isosceles triangle are equal.  D. Sum of adjacent angles. |
|  | What is the sum of the interior angles of a heptagon (seven sided polygon)?    A. 540o B. 720o  C. 900o D. 1 080o |
|  | There is 11 300 cm3 of liquid in this cylindrical tank.  What is the depth of the liquid?  A. 4 cm  B. 12 cm  C. 16 cm  D. 25 cm |
|  | What is the surface area of the solid shown?  A. 580 cm2  B. 860 cm2  C. 880 cm2  D. 920 cm2 |
|  | What is the volume of the solid shown?  A. 7.2 m3  B. 12.0 m3  C. 14.4 m3  D. 16.8 m3 |
|  | What is the size of angle *B*, to the nearest degree?    A. 37o  B. 40o  C. 50o  D. 53o |
|  | What is the value of *g*, correct to 1 decimal place?    A. 8.4 m  B. 9.3 m  C. 10.3 m  D. 11.3 m |
|  | What is the bearing of *P* from *Q* in the diagram?  A. 133o  B. 137o  C. 227o  D. 313o |
|  | Fully factorise  A.  B.  C.  D. |
|  | What is the equation of the line shown?  A.  B.  C.  D. |
|  | Which point does not lie on the line  ?  A. (-2, 0) B. (1, 2) C. (2, 3) D. (4, 4) |
|  | A.  B.  C.  D. |
|  | A.  B.  C.  D. |
|  | Questions 71 – 73 refer to the stem and leaf plot below.   |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  | 1 | 1 | 4 | 6 |  |  |  |  | |  |  |  |  |  | 2 | 2 | 5 | 6 | 7 | 8 |  |  | |  |  |  |  |  | 3 | 0 | 2 | 3 | 5 | 6 | 6 | 9 | |  |  |  |  |  | 4 | 2 | 4 | 7 | 9 |  |  |  | |  |  |  |  |  | 5 | 3 | 5 |  |  |  |  |  |   The sum of all the scores in the plot is 700. |
|  | What is the mean of the scores?  A. 32½ B. 33⅓ C. 36 D. 140 |
|  | What is the median of the scores in the plot?  A. 33 B. 35 C. 36 D. 44 |
|  | What is the interquartile range of the scores?  A. 17.5 B. 25.5 C. 43 D. 44 |
|  | Questions 74 and 75 refer to the frequency histogram below. |
|  | Which term could be used to describe the shape of the distribution?  A. Bimodal B. Negatively skewed  C. Positively Skewed D. Unimodal |
|  | Which measures would be equal?  A. The mean and the mode.  B. The mean and the range.  C. The mode and the median.  D. The median and the mean. |
|  | **End of Section 2**  **Part A** |

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| **Section 2**  **Part B**  Longer Answer Section | | Name : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| Class/Teacher\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
|  | Write all working and answers in the spaces provided on this examination paper.  Calculators are allowed for this section. | |

|  | | **Marks** |
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| 76. | Dom is comparing prices on packs of his dog Sampson’s favourite dried pet food.   * The 1.5 kg pack normally costs $2.85. * The 4 kg pack normally costs $6.20. * The 6 kg pack normally costs $8.50.   At the time he is comparing, the 1.5 kg pack is on sale at a 20% discount. |  |
|  | 1. What is the cost of the 1.5 pack after the discount?     …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. | **1** |
|  | 1. Which pack offers the best value for money at the time he is comparing?   (Justify your answer with mathematical calculations.)  …………………………………………………………………….………………………..  ……………………………………………………………………………..………………..  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. | **2** |

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| 77. |  |  |
|  | (a) Explain why  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. | **1** |
|  | (b) Find the size of  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. | **2** |
| 78. | A storage shed has a cross section which is a semi-circle with diameter 10 m.  The shed is 25 m long. |  |
|  | (a) What is the volume of the interior of the shed?    …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. | **1** |
|  | (b) The exterior walls and roof of the shed are to be painted with a paint that has a coverage of 12 m2 per litre. The paint is to be bought in 4 litre tins.  What is the area to be painted and how many tins of paint are needed?    …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. | **2** |
| 79. | A lifeguard’s observation tower, AB, is 16 m high and stands on a section of a beach which is 4 m above sea level. The base of the tower, B, is 34 m back along the beach from the edge of the water, C. |  |
|  | (a) What angle (to the nearest degree) does the beach make with the horizontal?  (The angle is marked *x*o)  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. | **1** |
|  | (b) What is the horizontal distance EC?  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. | **1** |
|  | (c) The angle of depression from the top of the tower, to a swimmer out to sea is 10o.  How far is the swimmer from the shore?  …………………………………………………………………….………………………..  …………………………………………………………………….………………………..  ……………………………………………………………………………..………………..  …………………………………………………………………….……………………….. | **2** |

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| 80. | Aaron has a collection of 120 movies.  There are 35 horror movies, 15 comedies, 40 thrillers and the rest are romances. |  |
|  | (a) If one movie is chosen at random from the collection, what is the probability that it is a comedy or a romance?  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. | **1** |
|  | (b) If one movie is chosen at random from the collection, what is the probability that it is not a thriller?  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. | **1** |
| 81. | The frequency distribution table gives the number of calls on a home phone on a random selection of days.     |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  |  | Number of Calls  (*x*) | Frequency  (*f*) | *Fx* | Cumulative Frequency | |  |  | 5 | 3 | 15 | 3 | |  |  | 6 | 7 | 42 | 10 | |  |  | 7 | 11 | 77 | 21 | |  |  | 8 | 15 | 120 | 36 | |  |  | 9 | 16 | 144 | 52 | |  |  | 10 | 12 | 120 | 64 | |  |  |  |  |  |  | |  |
|  | (a) What is the mean number of calls?  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. | **1** |
|  | (b) What is the median number of calls?  …………………………………………………………………….………………………..  …………………………………………………………………….……………………….. | **1** |
|  | (c) Describe the shape of the distribution.  …………………………………………………………………….………………………..  …………………………………………………………………….……………………….. | **1** |

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| 82. | Fully factorise the following expressions. |  |
|  | (a)  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. | **1** |
|  | (b)  …………………………………………………………………….………………………..  …………………………………………………………………….……………………….. | **1** |
| 83. | Solve the following equation, showing all relevant working.    …………………………………………………………………….………………………..  ……………………………………………………………………………..………………..  ……………………………………………………………………………..………………..  ……………………………………………………………………………..………………..  …………………………………………………………………….……………………….. | **2** |
| 84. | A number plane is shown with the points *A* (6, 7) and C (–3, –5) marked. |  |
|  | (a) Mark the points *B* (–3, 7) and *D* (8, –5) on the number plane.  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. | **1** |
|  | (b) Join the quadrilateral *ABCD* and find its area.  …………………………………………………………………….………………………..  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. | **1** |
|  | (c) Find the length of the diagonal *AC*.  …………………………………………………………………….………………………..  …………………………………………………………………….………………………..  ……………………………………………………………………………..……………….. | **1** |
|  | **End of Examination** |  |

High School

Half Yearly Exam

Mathematics Course

Multiple Choice Section Answer Sheet

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Teacher \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Completely fill the response oval representing the most correct answer.

26. A B C D

27. A B C D

28. A B C D

29. A B C D

30. A B C D

31. A B C D

32. A B C D

33. A B C D

34. A B C D

35. A B C D

36. A B C D

37. A B C D

38. A B C D

39. A B C D

40. A B C D

41. A B C D

42. A B C D

43. A B C D

44. A B C D

45. A B C D

46. A B C D

47. A B C D

48. A B C D

49. A B C D

50. A B C D

51. A B C D

52. A B C D

53. A B C D

54. A B C D

55. A B C D

56. A B C D

57. A B C D

58. A B C D

59. A B C D

60. A B C D

61. A B C D

62. A B C D

63. A B C D

64. A B C D

65. A B C D

66. A B C D

67. A B C D

68. A B C D

69. A B C D

70. A B C D

71. A B C D

72. A B C D

73. A B C D

74. A B C D

75. A B C D