

Name:	
Class:	



## YEARLY EXAMINATION

YEAR 9 2015

# MATHEMATICS

Time Allowed – 100 minutes plus 5 minutes Reading time.

### INSTRUCTIONS:

- Start each section on a new page
- Write your Name and Class at the top of each page
- Write in Pen and draw diagrams in Pencil
- Department of Education approved calculators are permitted
- The use of mathematical templates are permitted.
- Show all necessary working
- Marks may not be awarded for untidy or carelessly arranged work
- No grid paper is to be used unless provided with the examination paper
- **Teachers: Please collect each section separately.**

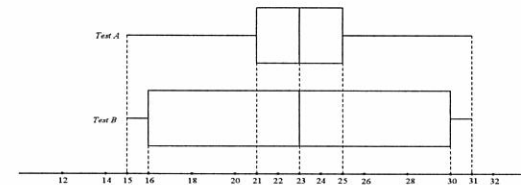
Outcomes	MC	A		B		C		D		E		Total
Number		1,2	/4	1	/3					1,2	/7	/14
Algebra		3,4,5,6	/9	2,3,4	/7			1,2,3	/13			/29
Geometry		7	/2	5	/2	1	/2			3	/4	/10
Measurement		8	/2	6	/2	2	/6			4,5	/6	/16
Stats/Prob				7	/3	3,4	/9	4	/4			/16
Other	/5											/5
Total	/5		/17		/17		/17		/17		/17	/90

### Multiple Choice – Please answer on the Multiple Choice Answer Sheet Provided

1. The solution to  $\frac{2x+1}{5} = 4 - \frac{x-1}{2}$  is:

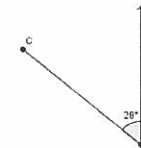
- a)  $x = \frac{43}{9}$       b)  $x = \frac{33}{9}$       c)  $x = \frac{47}{9}$       d)  $x = 43$

2. Class 7MK completed two class tests and the scores were analysed and displayed on a box plot. Which statement is definitely true?



- a) Test A has a higher mean than test B      b) Test A has a lower mean than test B  
 c) Test A has the same mean as test B      d) None of the above

3. For the following diagram. The true bearing of B from C is:



- a)  $028^{\circ}T$       b)  $152^{\circ}T$       c)  $208^{\circ}T$       d)  $332^{\circ}T$

4. Two regular dice are rolled. What is the probability that the sum of the two faces facing up not exceeding 10?

- a)  $\frac{1}{6}$                       b)  $\frac{11}{12}$                       c)  $\frac{5}{6}$                       d)  $\frac{1}{12}$

5. A car is bought for \$21000 and depreciates at 10% p.a., what is its value closest to after 8 years?

- a) \$11960                      b) \$9040                      c) \$16800                      d) \$4200

**END OF MULTIPLE CHOICE**

**Section A                      Start a new page                      (17 MARKS)**

Marks

1. Find the simple interest earned when \$5000 is invested at 5% p.a. for 6 years.

1

2. Express  $\frac{3+4\sqrt{7}}{\sqrt{7}-1}$  in the form of  $a + b\sqrt{c}$

3

3. Solve for  $x$ :

$$3x^2 - 7x + 1 = 0$$

2

4. Simplify  $\frac{3^{2n}-1}{3^{n+1}-3}$

2

5. Factorise into its linear factors:  $2x^3 - 6x^2 - 16x + 48$

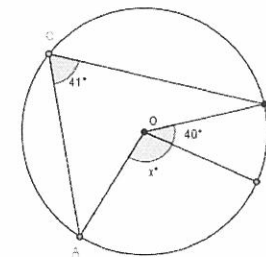
3

6. Make  $u$  the subject of the formula:  $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$

2

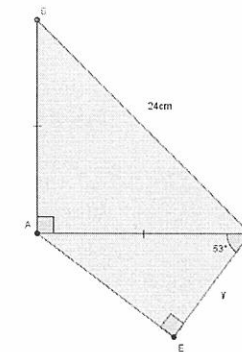
7. O is the centre of the circle. Find the value of  $x$ . Give reasons.

2



8. Find the value of  $y$  to the nearest cm. Give reasons.

2



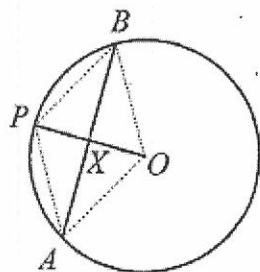
## SECTION B

Start a new page

(17 Marks)

Marks

- Find the interest earned when \$4500 is invested for 6 years at a rate of 4% p.a. compounded monthly
- By long division, find the quotient when  $2x^3 - x^2 - 25x - 12$  is divided by  $x - 4$ .
- Solve for  $x$ :  $\sqrt{x+2} = x - 10$
- Find the equation of the line through (2,3) perpendicular to  $4x - 5y = 10$
- AB is a chord of circle APB with centre O. If  $AB \perp OP$  and  $PX = XO$ , prove that APBO is a rhombus.



- Neatly sketch  $y = \tan x$  ( $0^\circ \leq x \leq 360^\circ$ )
- A bag contains 8 black marbles and 7 white marbles. Three marbles are chosen without replacement. Using a probability tree diagram or otherwise, find the difference in probability between getting 2 blacks and no blacks?

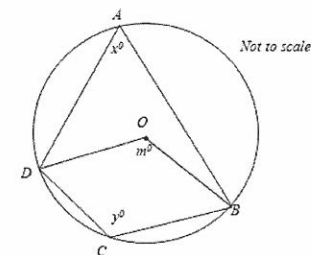
## SECTION C

Start a new page

(17 Marks)

Marks

- $ABCD$  is a cyclic quadrilateral of circle  $O$ . Copy the diagram onto your page. Express  $m^\circ$  in terms of  $y$  only. Give reasons.



- A ship begins sailing from a point O at a bearing of  $230^\circ T$  for 35km to Point A. It then stops and sails due East for 60km to Point B.
  - Draw a diagram illustrating all the information above.
  - Find the distance between B and O to the nearest km.
  - Find the true bearing of O from B to the nearest degree.
- Two letters from the word 'DECORATE' are randomly selected.
  - Draw a dot/grid diagram illustrating all possible outcomes
  - It is known that one of the letters is an 'E'. Find the probability that the other letter is 'D'
- The durability of 2 different brands of light bulbs was tested by measuring the length of time (in months) they stayed alight. Listed below are the results:
 

Brand A: 44, 56, 39, 29, 47, 39, 50, 46

Brand B: 38, 48, 2, 54, 50, 60, 48, 40

  - Construct an ordered back-to-back stem and leaf plot illustrating all the information.
  - Find the mean length of time for brand B.
  - Why is it not fair to say that Brand A is more durable because it has the higher mean?
  - Using a sample of the 4 highest scores from brand B, find the standard deviation.

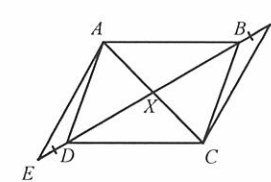
1. A 30cm piece of wire is cut to form a square and a rectangle. The square has side lengths equal to  $x$  cm, and the rectangle has side lengths  $x$  cm and  $y$  cm respectively.
  - a) Show that the combined area of the two shapes is given by  $A = -2x^2 + 15x$  2
  - b) Hence, find the maximum possible combined area of the two shapes and their corresponding dimensions. 3
  
2. If  $P(x) = (x + 1)^2(4 - x)(x + 2)$ ,
  - a) Make a neat sketch of  $P$ , clearly showing all the intercepts with the coordinate axes. 2
  - b) Hence solve:  $(x + 1)^2(4 - x)(x + 2) \leq 0$ , for  $x \in \mathbb{R}$ . 2
  
3.
  - a) Shade the region exactly determined by  $3x + 4y \leq 12$ ,  $x - 2y < 4$ , and  $x \geq 0$  3
  - b) Find the area of the shaded region. 1
  
4. 65 people were surveyed about their preferred soft drink between Coke, Fanta and Sprite. They had the option of choosing multiple answers. 29 of them chose Fanta, 22 chose Coke, 25 chose Sprite, 1 of them chose all three. 5 chose coke and sprite only while 3 chose Fanta and sprite only. 3 of them chose none.
  - a) Draw a Venn diagram illustrating all the information given. 3
  - b) A person is chosen at random. Find the probability that this person only drinks Coke. 1

1. Paige earns a gross salary of \$78000 per year. She claims \$20 worth of tax deductible work expenses per week. Using the table below:

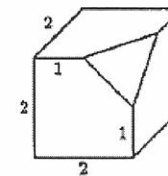
The following rates for 2015–16 apply from 1 July 2015.

Taxable income	Tax on this income
0 – \$18,200	Nil
\$18,201 – \$37,000	19c for each \$1 over \$18,200
\$37,001 – \$80,000	\$3,572 plus 32.5c for each \$1 over \$37,000
\$80,001 – \$180,000	\$17,547 plus 37c for each \$1 over \$80,000
\$180,001 and over	\$54,547 plus 45c for each \$1 over \$180,000

- a) Using 52 weeks in a year. What is Paige’s annual taxable income? 1
  - b) Calculate the annual tax payable from Paige’s income. 2
  - c) Paige starts a new job in the next financial year. She now earns a gross income of \$84000 a year without any tax deductible work expenses. How much more tax will she be paying? 2
2. Using the scale 1unit : 5cm. Mark exactly  $\sqrt{3}$  on a number line, using appropriate mathematical equipment and constructions. 2
  3. ABCD is a parallelogram. Diagram BD is extended so that BF = ED. Prove that AF = EC. Copy the diagram neatly onto your answer page. 4

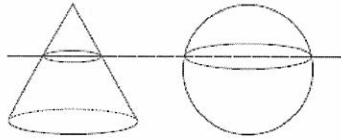


4. A cube has had one of its corners cut off, leaving a triangular dent. The dimensions in metres are shown. Find the surface area of the solid. 3



Please Turn Over

5. A sphere has radius 5 cm and a cone has height 10 cm and its base has radius 5 cm.



The sphere and cone sits on a horizontal surface as shown on the diagram. Find the height above the horizontal plane such that the circular cross section of the two solids have equal area.  
(You may use similar triangle properties without proving them)

3

~ END OF EXAM ~