THIRD FORM MATHEMATICS   **P. CADOGAN**
Promotion Examination 2009   **Harrison College**

Time $1\frac{3}{4}$ hours   **180 Copies**

INSTRUCTIONS

This question paper consists of <u>FOUR</u> printed pages.
Write your name clearly on <u>EACH</u> sheet of paper used.
Number your answers carefully and do **NOT** do questions beside one another.

All of the questions are to be attempted.
Calculators are allowed.
<u>Write on your foolscap</u> the LETTER that matches your response for Questions 1 – 10.
All working **MUST** be shown for questions <u>11 – 18</u>.
Graph paper is available if required.

If a numerical answer cannot be given <u>exactly</u>, and the accuracy required is not specified in the question, then in the case of an angle it should be given to the <u>nearest degree</u>, in other cases it should be given correct to <u>three (3)</u> significant figures.

1. The result of $\dfrac{a^2(a+b)}{a}$ is

     (A) $a^2(1+b)$ (B) $a^2(a^2+b)$ (C) $a\,(a+b)$ ·   (D) $a^3(a+b)$

2. The value of the expression $(pqr)^2$ when $p = 2$, $q = -1$ and $r=\dfrac{1}{2}$ is:

     (A) 1 (B) -1 (C) 4 (D) 2

3. $(-2y)$ subtracted from $(-3y)$ is:

     (A) $-5y$ B) $-y$ (C) y (D) $6y^2$

4. Given that k is a constant, and that m is inversely proportional to n then

     (A) $m = n$ (B) $m = kn$ (C) $n = k$ (D) $m = \dfrac{k}{n}$

5. $EC\ \$1.00 = BDS\ \$\,0.75$, so $BDS\ \$7.50 =$

     (A) $EC\ \$75.00$ (B) $EC\ \$10.00$ (C) $EC\ \$100.00$ (D) $EC\ \$7.50$

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6. The simple interest on *$200*, invested for *2* years at *2%* per annum is:

   (A) *$4*   (B) *$100*   (C) *$8*   (D) *$50*
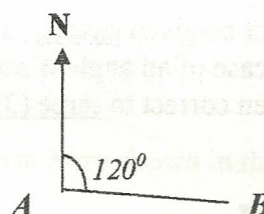
7. Which one of the following sets of numbers represents a function.

   (A) *(1, 2), (2, 3), (3, 4), (4, 5)*
   (B) *(1, 2), (1 ,4), (3, 8), (5, 12)*
   (C) *(0, 14), (2, 6), (2, 9), (4, 6)*
   (D) *(-6, -2), (-6, -4), (-2, 5), (4, 2)*

8. The volume of a cone is given by

   (A) $4\pi r^2$ (B) πr^2 (C) $\dfrac{3}{4}\pi r^3$ (D) $\dfrac{1}{3}\pi r^2 h$

9. In the diagram below, the bearing of *A* <u>from</u> *B* is:

   (A) 60^0 (B) 240^0 (C) 300^0 (D) 120^0

10. Which one of the following is <u>NOT</u> a measure of central tendency in Statistics.

   (A) mean   (B) graph   (C) median   (D) mode

                                                         [Total: 10]

11. *p* varies directly as *(t + 1)³*. *p = 16* when *t = 1*. Find *p* when *t = 3*.   [5]

12. Jane's car cost *$40 000* new. It depreciates in value by *20%* per year. Calculate the car's value after *2* years.   [4]

13. Jim's annual income for the year *2008* was *$28 500*. His tax-free allowances are shown in the table below.

<div align="center">

Tax-Free Allowances

Personal Allowance	$5000 per year
Utilities Allowance	5% of Annual Income

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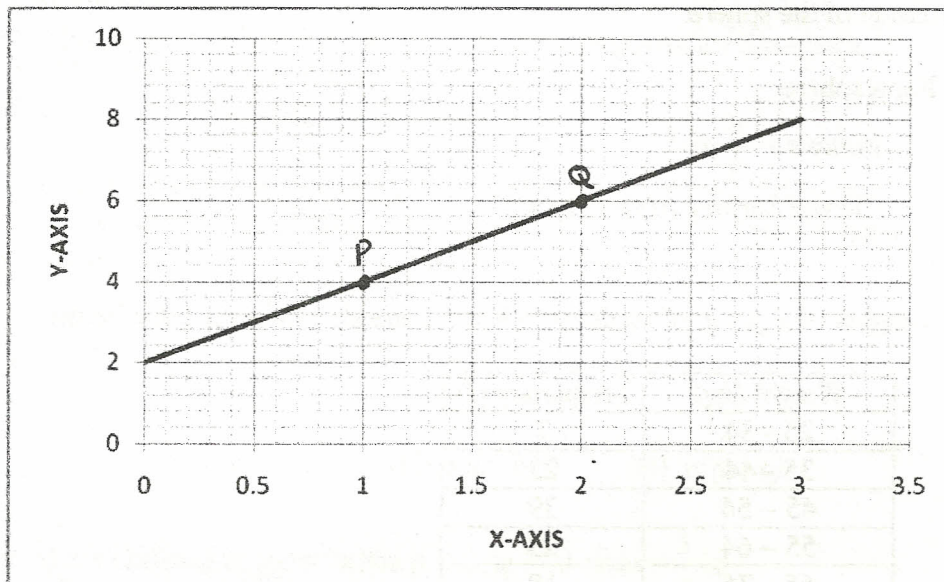2

Calculate for income year *2008*

a) (i) Jim's TOTAL tax-free allowances.
   (ii) Jim's TAXABLE income.

[5]

b) A *8%* tax is charged on the FIRST $20 000 of TAXABLE INCOME.
   A *12%* tax is charged on the portion of taxable income ABOVE $20 000.
   Calculate the TOTAL amount of income tax Jim pays.

[5]

14. The figure below (not drawn to scale) shows a straight line passing through the points
    P and Q.

i) Write down the coordinates of the points P and Q.

Find, <u>by calculation</u>, the

ii)   length of the line segment PQ.
iii) mid-point of the line segment PQ.
iv)   gradient of the line segment PQ.
v)   equation of the perpendicular line that passes through the mid-point of the
      line segment PQ.

[12]

15. Solve the simultaneous equations
    $5x - 3y = 18$
    $3x + 2y = 7$

[8]

3

16. The curved surface area of the sphere below is 616 cm^3.

Taking $\pi = \dfrac{22}{7}$, calculate EXACTLY the

i) radius of the sphere

ii) volume of the sphere.

[5]

NOTE: For a sphere

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

$$Curved\ Surface\ Area = 4\pi r^2$$

17. The weights of a group of students in Form 3 are shown in the table below.

Weight (kg)	Frequency (f)
25 - 34	7
35 - 44	23
45 – 54	39
55 – 64	23
65 - 74	18

i) How many students are in the group?

ii) State the modal class.

iii) By finding the mid-interval value, calculate the mean weight of the students.

iv) Calculate the probability that a student chosen at random weighs <u>AT MOST</u> 44 kg.

[10]

18. A vertical tower *TG*, of height *20m* stands on horizontal ground at *G*. <u>From</u> a point *H*, due EAST of *G*, the angle of elevation of *T* is 25^0.

i) Draw a clearly labelled diagram showing <u>ALL</u> the points, angles and distances.

ii) Calculate the distance *TH*.

[6]

End of Examination