St Aloysius' College
Year 9 5.3 Term I Mathematics Assessment
4th April 2018

Time allowed: 40 minutes

Total Marks: **42**

NAME: ..... SOLUTIONS .....

TEACHER: **ADA** **JWL/SRO** **GON** **IMO**

Instructions:

- Approved calculators may be used.
- All necessary working is to be shown for Free Response Questions.
- Marks may be deducted for careless or poorly arranged work.

SECTION 1: COMPUTATION AND FINANCIAL MATHEMATICS (20 MARKS)

Multiple Choice

5 Marks

For questions 1 – 5, circle the correct answer, A, B, C or D.

$2 \div 11 = 0.1818...$

1. $\frac{2}{11}$ written as a decimal is:

(A) 0.18 (B) $0.1\dot{8}$ (C) $0.\overline{18}$ (D) 0.1818

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2. 750g as a percentage of 3kg is

$\frac{750}{3000} \times 100 =$

(A) 250% (B) 25% (C) 2.5% (D) 0.25%

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3. The number 5.2083 written to three significant figures is:

(A) 5.2082 (B) 5.208 (C) 5.20 (D) 5.21

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4. If 15% of an amount is \$3 000, the whole amount is:

$15\% = 3000$

$1\% = 3000 \div 15$

$100\% = (3000 \div 15) \times 100$

(A) \$20 000 (B) \$2 000 (C) \$200 (D) \$18 000

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5. How much does Jack need to invest, to the nearest dollar, at 6% per annum compounded annually for 3 years to have \$15,000 in his investment account?

$15000 = P(1+6\%)^3$

(A) \$15 000 (B) \$12 594.29 (C) \$12 594.00 (D) \$12 595.00

$P = \frac{15000}{(1+6\%)^3}$

Short Answer

5 Marks

Give your answer **only** in the right hand column. All questions are worth one mark.

	Answer
1. Simplify the ratio $\frac{3}{2}:6$.	1 : 4
2. Sam travels 150 km in 2.5 hours. What is his average speed? $S = \frac{D}{T} = \frac{150}{2.5}$	60km/hr
3. Tom's usual weekly wage is \$725. His receives a 12% wage increase. What is his new weekly wage? 725×1.12	\$812
4. Divide \$135 into the ratio 7:8. $7+8=15$ $\frac{7}{15} \times 135 =$ $\frac{8}{15} \times 135 =$	\$63, \$72
5. Calculate the interest earned on \$5 500 if it is invested at 4% p.a. compounded annually for 2 years. $5500(1+4\%)^2 = 5948.80$ $5948.80 - 5500$	\$448.80

Free Response Questions

10 Marks

All necessary working is to be shown.

1. What is the value of an investment of \$10 000 at 5.25% p.a. simple interest after 3 years. **2**

$SI = Prt$

$= 10000\left(\frac{5.25}{100}\right)^{\times 3}$

$= \$1575$

$\therefore 10000 + 1575 = \$11,575$

2. Ben's income for a particular week was \$687.96. He is paid \$16.38 an hour for 34 hours, and double time for any hours worked after that. Calculate the number of hours of overtime he worked in that particular week. **3**

$(16.38 \times 34) = 556.92$

$\therefore 687.96 - 556.92 = 131.04$

$$\frac{131.04}{(16.38 \times 2)} = 4$$

$\therefore$ 4 hours

3. Alexander is taking 4 weeks annual leave. For his holiday period, he is paid \$5076. This includes his normal pay plus 17.5% leave loading. Find his annual salary. **2**

$$\frac{5076}{1.175} = \$4320$$

$$\frac{4320}{4} \times 52 = \$56,160$$

4. In a particular country in 2016, 85% of the population are employed, whilst the rest are unemployed. The following year 10% of the unemployed became employed, whilst 10% of the employed became unemployed. What percentage of the population are employed in 2017? *Hint: let the population be 1000.* **3**

Population = 1000

Employed = 850 (85% of 1000)

Unemployed = 150 (15% of 1000)

$\therefore$ 10% of 150 = 15 → employed

10% of 850 = 85 → unemployed

$\therefore$ Employed 850 + 15 − 85 = 780

Unemployed 150 − 15 + 85 = 220

$\therefore$ 78%

END OF SECTION 1

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SECTION 2: ALGEBRAIC TECHNIQUES AND INDICES (22 MARKS)

Multiple Choice

5 Marks

For questions 1 – 5, circle the correct answer, A, B, C or D.

1. Expand $5(3-x)$:

(A) $15-3x$ (B) $15-x$ (C) $15-5x$ (D) $-15-5x$

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2. Solve $3x-2\geq 7$

$3x \geq 9$

$x \geq \frac{9}{3}$

(A) $x\leq 3$ (B) $x\geq 3$ (C) $3x\geq 9$ (D) $x\geq\frac{5}{3}$

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3. How many solutions are there to the equation $9x^2=1$?

$x^2=\frac{1}{9}$ $x=\pm\frac{\sqrt{1}}{\sqrt{9}}=\pm\frac{1}{3}$

(A) 4 (B) 0 (C) 1 (D) 2

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4. Factorise the following expression $6p^2q^2+4pq^2$:

$2pq^2(3p+2)$

(A) $2pq^2(3p+2)$ (B) $2q^2(3p^2+2p)$ (C) $pq^2(6p+4)$ (D) $2pq^2(3+2p)$

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5. Simplify the following expression $3(x^3y^0)^2$

$3(x^3(1))^2 = 3(x^3)^2$

(A) 3 (B) $3x^6y^2$ (C) $9x^6y^2$ (D) $3x^6$

Short Answer

6 Marks

Give your answer **only** in the right hand column. All questions are worth one mark.

	Answer
1. Solve $\frac{x}{2}=5$	$x=10$
2. Solve $3(x+3)=18$ $3x+9=18$ $3x=9$ $x=\frac{9}{3}$	$x=3$
3. Expand and simplify $2(y+1)-5(y+2)$ $2y+2-5y-10$	$-3y-8$
4. Solve $\frac{-3x}{2}\geq 6$ $-3x\geq 12$ $x\leq \frac{12}{-3}$	$x\leq -4$
5. Solve $\frac{a}{5}-a=4$ $a-5a=20$ $-4a=20$ $a=\frac{20}{-4}$	$a=-5$
6. Make a the subject in the following formula: $b=\frac{c^2}{a}+d$ $ab=c^2+ad$ $ab-ad=c^2$ $a(b-d)=c^2$	$a=\frac{c^2}{b-d}$

Free Response Questions

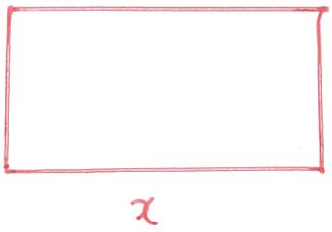
11 Marks

All necessary working is to be shown.

1. Simplify the following expression: $\frac{20a^4b^2}{4a^2b}\times\frac{16ab^3}{10}$ **2**

$\frac{320a^5b^5}{40a^2b}$ $=8a^3b^4$

2. A classroom has a width 6 m shorter than its length and a perimeter of 30 m. Find the dimensions of the classroom by first constructing an equation. **3**



$P = 30$

$30 = x + (x-6) + x + (x-6)$

$30 = 4x - 12$

$4x = 42$

$x = 10.5$

∴ length 10.5 Width 4.5

∴ Dimensions 4.5 × 10.5

3. Solve the following simultaneous equations: **2**

$2x + y = 5$ ... ① $\longrightarrow$ $y = 5 - 2x$ ... ③

$3x + 2y = 8$ ... ②

Sub ③ into ②

$3x + 2(5-2x) = 8$

$3x + 10 - 4x = 8$

$-x + 10 = 8$

$-x = -2$

$x = 2$

Sub $x = 2$ into ③

$y = 5 - 2(2)$

$y = 5 - 4$

$y = 1$

∴ $x = 2$, $y = 1$

4. For a certain fraction, if 1 is added to the numerator and 1 is subtracted from the denominator the result is 1. For the same fraction, if 1 is subtracted from the numerator and 1 is added to the denominator the result is 3. By first forming simultaneous equations, find the fraction. **4**

Let numerator $= x$
denominator $= y$

$$\frac{x+1}{y-1} = 1 \quad \ldots (1) \longrightarrow x+1 = y-1$$
$$x = y-2 \quad \ldots (3)$$

$$\frac{x-1}{y+1} = 3 \quad \ldots (2)$$

Sub (3) into (2)
$$\frac{(y-2)-1}{y+1} = 3$$
$$\frac{y-3}{y+1} = 3$$
$$y-3 = 3(y+1)$$
$$y-3 = 3y+3$$
$$-6 = 2y$$
$$-3 = y$$

Sub $y=-3$ into (3)
$$x = (-3)-2$$
$$x = -5$$

$\therefore$ Fraction $\frac{-5}{-3}$

END OF ASSESSMENT