St Aloysius' College
Year 9 5.3 Term I Mathematics Assessment
5th April 2019

Time allowed: 45 minutes

Total Marks: 37

NAME: SOLUTIONS

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

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: FINANCIAL MATHEMATICS (10 MARKS)

Multiple Choice

4 Marks

For questions 1 – 4, circle the correct answer, A, B, C or D.

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1. Tom earns \$3870 per month. Calculate his monthly salary if he is given a 2.5% pay rise.

3870×1.025
$= 3966.75$

(A) \$3 967

(C) \$96.75

(B) \$4 644

(D) \$3 966.75

2. Lily earns \$700 per week plus 5% commission on her total weekly sales over \$60 000. What are her earnings in a week when her total sales were \$100 000?

$700 + 0.05(40\,000)$
$= 2700$

(A) \$2 000

(C) \$5 000

(B) \$2 700

(D) \$5 700

3. \$1400 is invested at 6% per annum. How much simple interest is earned after two months?

$1400 \times 0.06 \times \frac{2}{12}$
$= 14$

(A) \$14

(C) \$168

(B) \$140

(D) \$1680

4. Eve earns \$16.80 per hour for the first 4 hours she works each day. For any additional hours she works, she earns an additional 30% loading. Last week Eve worked 4 hours on Monday and 6 hours on both Tuesday and Wednesday. What was Eve's total earnings for the week?

(A) \$221.76

(B) \$349.44

$12 \times 16.80 + 4 \times 16.80 \times 1.3 = 288.96$

(C) \$288.96

(D) \$268.80

Free Response Questions

6 Marks

5. Calculate the interest earnt on an investment of \$6 500 for 3 years at 3% per annum, compounded yearly **2**

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

$= 6500(1+0.03)^3$

$= 7102.73$

$\therefore$ Interest $= 7102.73 - 6500$

$= \$602.73$

6. Vicki earns a salary of \$58 624 from her job with an insurance company. At the end of the financial year, she claims \$4 410.80 in allowable tax deductions.

a. Use the tax table below to calculate the total tax payable on her income. **2**

Taxable income	*Tax payable*
\$0 – \$18 200	Nil
\$18 201 – \$37 000	19 cents for each \$1 over \$18 200
→ \$37 001 – \$90 000	\$3 572 plus 32.5 cents for each \$1 over \$37 000
\$90 001 – \$180 000	\$20 797 plus 37 cents for each \$1 over \$90 000
\$180 001 and over	\$54 097 plus 45 cents for each \$1 over \$180 000

Taxable Income $= 58\,624 - 4410.80$

$= \$54\,213.20$

Tax payable $= 3572 + 0.325(54213.20 - 37\,000)$

$= \$9166.29$

b. During the past financial year Vicki paid \$175 per week in PAYG tax. Calculate whether she will receive a tax refund or if she owes further tax and indicate how much it would be. **2**

Tax paid: $175 \times 52 = 9100$

$\therefore$ She owes \$66.29

END OF SECTION 1

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SECTION 2: EXPRESSIONS, EQUATIONS AND INEQUALITIES (15 MARKS)

Multiple Choice

4 Marks

For questions 1 – 4, circle the correct answer, A, B, C or D.

1. Simplify $6x - 3 + 2x - 1$

(A) $8x + 4$ (B) $8x + 2$ (C) $8x - 2$ (D) $8x - 4$

2. Given, $6(x-3)+4x=12$, then:

$6x - 18 + 4x = 12$

$10x = 30$

$x = 3$

(A) $x = 2$ (B) $x = 3$ (C) $x = 4$ (D) $x = 5$

3. Justin earns \$15 for the first hour of babysitting and \$10 per hour.
He babysat for n hours. Which expression represents the amount Justin earned?

(A) $10n + 1$ (B) $10n + 15$ (C) $15n - 1$ (D) $25n$

4. Solve $4(7-2x) \geq 36$

$7 - 2x \geq 9$

$-2x \geq 2$

$x \leq -1$

(A) $x \geq 1$ (B) $x \leq 1$ (C) $x \geq -1$ (D) $x \leq -1$

Free Response Questions

11 Marks

All necessary working is to be shown.

5. Expand and simplify $4w - (w - 7) - 2$ **1**

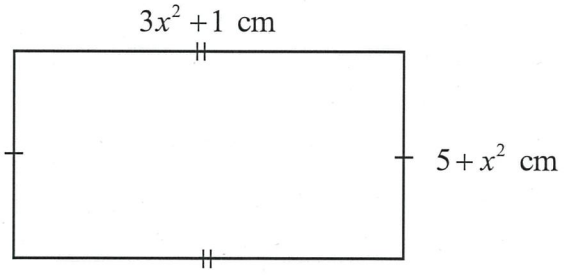
$4w - w + 7 - 2$

$= 3w + 5$

6. Simplify $\frac{15x^2y}{10wxy}$ **1**

$= \frac{3x}{2w}$

7. The rectangle illustrated below has a perimeter of 140 cm. Form an equation and solve it to find the dimensions of the rectangle. **3**



$2(3x^2 + 1 + 5 + x^2) = 140$

$2(4x^2 + 6) = 140$

$4x^2 + 6 = 70$

$4x^2 = 64$

$x^2 = 16$

$x = \pm 4$

$x = 4$ $(x > 0$, length$)$

$\therefore$ Dimensions are 4×21.

8. Solve $\frac{2(m+1)}{3}+1 \leq \frac{m-4}{2}$ **3**

$6\left[\frac{2(m+1)}{3}\right] + 1\times 6 \leq 6\left[\frac{m-4}{2}\right]$

$2[2(m+1)] + 6 \leq 3(m-4)$

$4(m+1) + 6 \leq 3m - 12$

$4m + 4 + 6 \leq 3m - 12$

$m \leq -22$

9. A secretary buys a number of 45-cent and 60-cent stamps for a total of \$22.50. If he interchanges the numbers of the two kinds of stamps, the total cost would have been \$23.70. Form a pair of simultaneous equations and solve to find how many of each kind of stamp he originally purchased. **3**

Let 45c stamps = x

Let 60c stamps = y

$\therefore 45x + 60y = 2250$ (1) $\times 4$

$45y + 60x = 2370$ (2) $\times 3$

$\therefore 180x + 240y = 9000$ (1A)

$135y + 180x = 7110$ (2A)

(1A) − (2A)

$105y = 1890$

$y = 18$ $\therefore$ 18 60c stamps

$180x + 240(18) = 9000$ 26 45c stamps

$180x = 4680$

$x = 26$

END OF SECTION 2

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SECTION 3: RIGHT-ANGLED TRIANGLES (12 MARKS)

Multiple Choice

2 Marks

For questions 1 – 2, circle the correct answer, A, B, C or D.

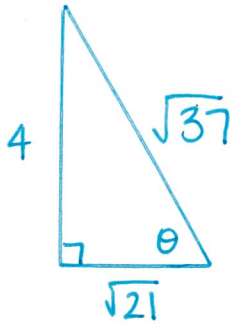
1. $\cos 33°27'$ is approximately equal to:

(A) 0.8360 (B) 0.8387 (C) 0.8344 (D) 0.5512

$= 0.834367\ldots$

2. If $\tan\theta = \frac{4}{\sqrt{21}}$ in a right angled triangle, what is the exact value of $\sin\theta$?

(A) 0.6576 (B) $\frac{3}{\sqrt{37}}$ (C) $\frac{4}{\sqrt{37}}$ (D) $\frac{4}{3}$



$4^2 + (\sqrt{21})^2 = 16 + 21$

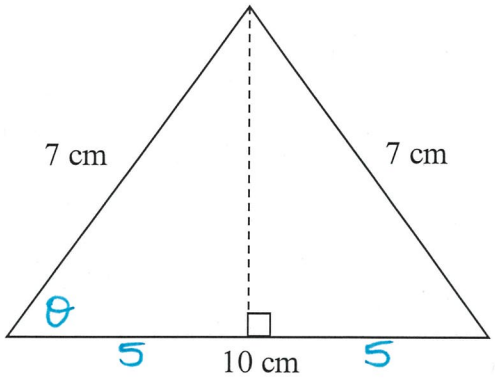
$= 37$

$\sin\theta = \frac{O}{H}$

Free Response Questions

10 Marks

3. Find the base angles of the isosceles triangle illustrated below, correct to the nearest degree. **2**

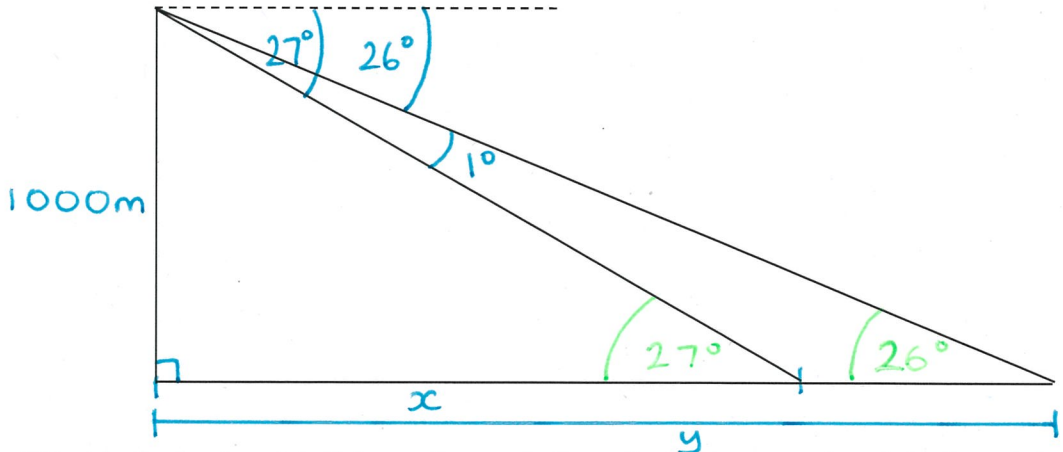


$\cos\theta = \frac{5}{7}$ $\theta = \cos^{-1}\left(\frac{5}{7}\right)$

$\doteq 44°$

4. A police helicopter, hovering at an altitude of 1000m, observes a car travelling along a straight highway. At that instant, the angle of depressions of the car from the helicopter is 27°. Five seconds later, the angle of depression of the car from the helicopter is 26°.

a. Complete the following diagram with all the information provided. **1**



b. What is the horizontal distance the car is from the helicopter when it is first sighted? Answer to the nearest metre. **2**

$\tan 27 = \frac{1000}{x}$ $x = 1962.6\ldots$

$x \doteq 1963\text{m}$

$x = \frac{1000}{\tan 27}$

c. Calculate the distance the car travelled between the two sightings by the police helicopter. Answer to the nearest metre. **2**

$\tan 26 = \frac{1000}{y}$ $\quad y = 2050.3...$

$y \doteq 2050$

$y = \frac{1000}{\tan 26}$

Distance travelled $= 2050 - 1963$

$= 87\text{m}$

d. The speed limit on this stretch of road is 60km/h. Is the car driving at a legal speed or not? Justify your answer using calculations. **3**

$87\text{m} / 5\text{s} = 17.4\text{m/s}$

$17.4\text{m/s} \times 60 \times 60 \div 1000$

$= 62.64\text{km/h}$

$\therefore$ No the car is speeding by 2.64km/h

END OF ASSESSMENT