

**St Aloysius' College**  
**Year 9 5.3 Term I Mathematics Assessment**  
**Tuesday 4<sup>th</sup> April 2017**



Time allowed: 45 minutes

Total Marks: 45

NAME: SOLUTIONS  
TEACHER: IMO GON MCR PLU

**Instructions:**

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

**PART A:      Multiple Choice Questions:**

**10 marks**

For questions 1 – 10, circle the correct answer, A, B, C or D on the separate multiple choice answer sheet

1. 0.030 142 written to 3 significant figures is

- (A) 0.03      (B) 0.03014      (C) 0.0301      (D) 0.030

2. The solution of the equation  $\frac{-x}{3} = 6$  is:

(A)  $x = 18$

$$\begin{aligned} -x &= 18 \\ x &= -18 \end{aligned}$$

(B)  $x = -2$

(C)  $x = \frac{1}{2}$

(D)  $x = -18$

3. What decimal number do you multiply \$50 by to decrease it by 10%?

(A) -0.1

(B) 0.9

(C) 1.1

(D) 1.9

4. Brett received a 30% discount on a trailer, which amounted to a saving of \$27. The price he paid for the trailer was:

(A) \$63

(B) \$57

(C) \$97

(D) \$117

$$\begin{aligned} &\text{Brett paid } 70\% \\ &\therefore 30\% \text{ is } \$27 \\ &\quad \div 30 \\ &\quad \times 70 \\ &70\% \text{ is } \underline{\$63} \end{aligned}$$



5. Expand  $4 - 2(5 - 3x) = 4 - 10 + 6x$

$$= 6x - 6$$

(A)  $10 - 6x$

(B)  $-6 - 3x$

(C)  $-6 + 3x$

(D)  $-6 + 6x$

6. The value of  $x$  is

(A)  $6 \tan 40$

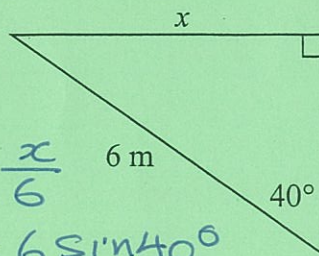
(B)  $\frac{6}{\tan 40}$

(C)  $6 \sin 40$

(D)  $\frac{6}{\sin 40}$

$$\sin 40^\circ = \frac{x}{6}$$

$$x = 6 \sin 40^\circ$$



7. An angle of  $36.2^\circ$  is equivalent to:

(A)  $36^\circ 20'$

(B)  $36^\circ 12'$

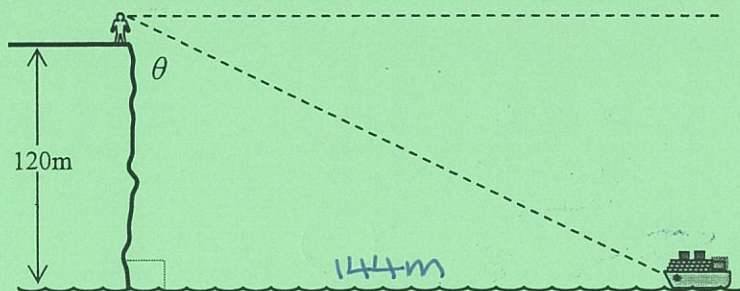
(C)  $36^\circ 30'$

(D)  $36^\circ 2'$

8. Find the size of the angle  $\theta$ , to the nearest minute, if the ship is 144 m out to sea.

$$\tan \theta = \frac{144}{120}$$

$$\theta = \tan^{-1}\left(\frac{144}{120}\right)$$



(A)  $56^\circ 26'$

(B)  $39^\circ 48'$

(C)  $33^\circ 56'$

(D)  $50^\circ 12'$

9. Mick works for a company selling phone contracts.

He is paid \$400 each week plus 15% commission on any sales over \$1500 each week.

how much does he earn in a week when his sales are \$3200?

$$400 + 0.15(3200 - 1500)$$

(A) \$655

(B) \$480

(C) \$255

(D) \$880

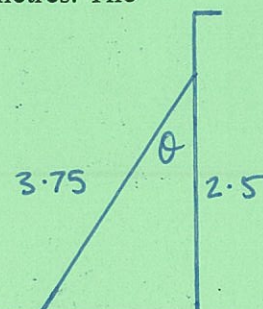
10. A 3.75 metre ladder leans against a wall with its top reaching to a height of 2.5 metres. The angle the ladder makes with the wall is given by:

(A)  $\sin^{-1}(2.5 \div 3.75)$

(B)  $\cos^{-1}(2.5 \div 3.75)$

(C)  $\tan^{-1}(2.5 \div 3.75)$

(D) All of these



End of Part A



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**PART B:****Short Answer Questions:** 10 questions. All questions are worth one mark.**10 marks**

1. Simplify  $\frac{6ab}{18b}$

$$\frac{\cancel{6}a\cancel{b}}{\cancel{18}b} = \frac{a}{3}$$

2. Find the value of a machine after 5 years if its original value was \$136000 and its rate of depreciation was 15% pa. Answer to the nearest dollar

$$V = 136000(1 - 0.15)^5 = 60343.9225 \\ \div \$60344$$

3. Solve the inequality
- $5 - 4x > 15$

$$-4x > 10 \\ x < -\frac{5}{2} \text{ (or } -2\frac{1}{2})$$

4. Expand and simplify
- $5(a - b) - 6(2a + b)$

$$= 5a - 5b - 12a - 6b \\ = -7a - 11b$$

5. Simplify:
- $16ab \times 4a \div 8b =$

$$\frac{\cancel{16}4a^2\cancel{b}}{\cancel{8}b} = 8a^2$$

6. Solve
- $\frac{2a}{3} = \frac{3}{2}$

$$4a = 9 \\ a = \frac{9}{4} \text{ (or } 2\frac{1}{4})$$

7. What simple interest rate would allow \$6000 to grow to an amount of \$14500 in 10 years?
- 
- Answer to 1 decimal place

$$\text{Interest} = 14500 - 6000 \\ = 8500$$

$$I = Prn$$

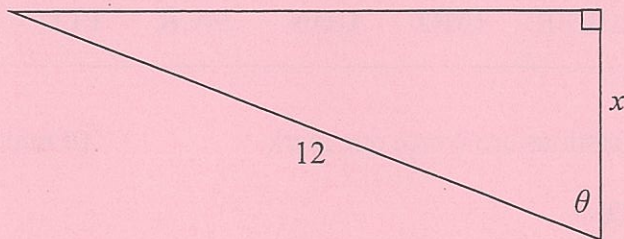
$$8500 = 6000 \times r \times 10$$

$$r = \frac{8500}{6000 \times 10} \\ = 0.141\bar{6}$$

$$\therefore \text{Simple interest rate} = 14.2\%$$



8. If  $\cos \theta = 0.25$ , what is the value of  $x$ ?



$$\begin{aligned}\cos \theta &= \frac{A}{H} \\ 0.25 &= \frac{x}{12} \\ \therefore x &= 3\end{aligned}$$

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Questions 9 and 10 refer to the following

A car is advertised for the cash price of \$8490. Julie buys the car on the following terms

- \$490 deposit
- 16% p.a. simple interest
- equal monthly repayments over 5 years

$$\begin{aligned}\text{Owing after deposit} &= 8490 - 490 \\ &= \$8000\end{aligned}$$

9. Calculate the amount of interest she will pay in one year.

$$\begin{aligned}I &= Prn \\ &= 8000 \times 0.16 \times 1 \\ &= \$1280\end{aligned}$$

- 
10. Find the amount she has to pay per month.

$$\begin{aligned}\text{Interest in 5 years} &= 5 \times 1280 \\ &= \$6400\end{aligned}$$

$$\begin{aligned}\text{Total owing} &= 8000 + 6400 \\ &= \$14400\end{aligned}$$

$$\begin{aligned}\text{Monthly Repayments} &= 14400 \div (5 \times 12) \\ &= \$240 \text{ per month.}\end{aligned}$$



## PART C:

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All necessary working is to be shown for Part C.

25 marks

### Question 1

Isabella works in a restaurant and earns \$7.20 per hour at the normal rate.  
Each week Isabella works for 11 hours at the normal rate and 4 hours at time and a half.

- (a) Find her weekly wage.

2

$$\begin{aligned} &= 11 \times 7.20 + 4 \times 1\frac{1}{2} \times 7.20 \\ &= 79.20 + 43.20 \\ &= \$122.40 \end{aligned}$$

- (b) Isabella would like to increase her weekly wage in part (a) to \$180 by working extra hours at the normal rate. How many extra normal hours must Isabella work?

2

$$(180 - 122.40) \div 7.20 = 8$$

Isabella needs to work another  
8 normal hours.

- (c) Isabella's hourly rate of pay is increased by 6%. Find the new hourly rate for normal hours, to the nearest cent.

1

$$\begin{aligned} &106\% \text{ of } \$7.20 \\ &= 1.06 \times 7.2 \\ &= 7.632 \\ &\div \$7.63 \end{aligned}$$

### Question 2

\$15000 is invested at a compound interest rate of 9% pa. Interest however is compounded monthly. Calculate the amount to which the investment will grow in 3 years.  
Answer to the nearest cent

3

$$\begin{aligned} \text{monthly rate} &= 0.09 \div 12 \\ &= 0.0075/\text{mth} \end{aligned} \quad \begin{aligned} \text{time periods} &= 3 \times 12 \\ &= 36 \text{ mths} \end{aligned}$$

$$\begin{aligned} \therefore A &= 15000 (1.0075)^{36} \\ &= 19629.68056 \\ &\div \$19629.68 \end{aligned}$$

### Question 3

Solve the following pair of simultaneous equations:

2

$$3x - 2y = 4 \quad \dots \textcircled{1}$$

$$x + 3y = 5 \quad \dots \textcircled{2}$$

From  $\textcircled{2}$ :  $x = 5 - 3y$  (2A)

Sub (2A) into  $\textcircled{1}$

$$3(5 - 3y) - 2y = 4$$

$$15 - 9y - 2y = 4$$

$$15 - 11y = 4$$

$$-11y = -11$$

$$y = 1 \rightarrow *$$

Sub  $y = 1$  into  $\textcircled{2}$

$$x + 3(1) = 5$$

$$x + 3 = 5$$

$$x = 2 \rightarrow *$$

Hence:

$$x = 2, y = 1$$

### Question 4

The following table shows the tax to be paid on various taxable incomes.

Taxable Income	Tax Payable
\$0 – \$18,200	NIL
\$18,201 – \$37,000	19 cents for each \$1 over \$18,200
→ \$37,001 – \$80,000	\$3,572 plus 32 cents for each \$1 over \$37,000
\$80,001 – \$180,000	\$17,547 plus 37 cents for each \$1 over \$80,000
\$180,001 and over	\$54,547 plus 45 cents for each \$1 over \$180,000

Jacob earned a salary of \$43 805 and received additional income from “Party Plan” sales of \$1080. He had allowable tax deductions of \$980.

Find:

- (a) His taxable income.

1

$$= 43805 + 1080 - 980$$

$$= \$43905$$

- (b) The tax payable on his taxable income.

2

$$= 3572 + 0.32(43905 - 37000)$$

$$= \$5781.60$$

### Question 5

The sum of a brothers and sisters age is 26. The brother is 7 years younger than twice his sisters age. 3  
Use the above information to form a pair simultaneous equations, solve them and hence find the brothers and sisters ages.

Brother	Sister
b	t

$$b + t = 26 \quad \text{--- (1)}$$

$$b = 2t - 7 \quad \text{--- (2)}$$

Sub (2) into (1)

$$2t - 7 + t = 26$$

$$3t = 33$$

$$t = 11 \quad *$$

Sub  $t = 11$  into (2)

$$b = 2(11) - 7$$

$$b = 15 \quad *$$

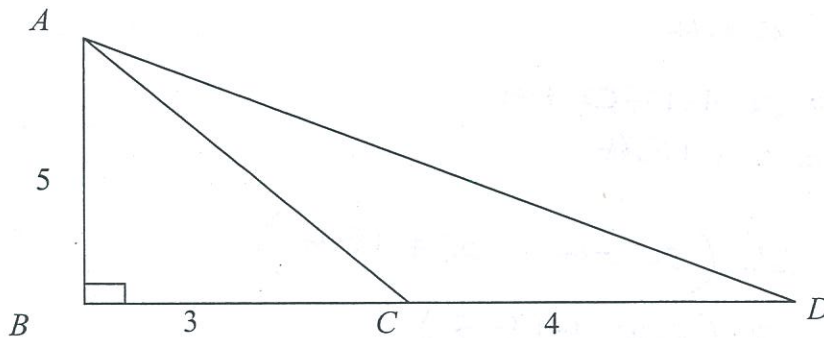
Hence:

brother is 15 years

sister is 11 years.

### Question 6

From the diagram below, determine the size of  $\angle CAD$  to the nearest degree. 3



\* In  $\triangle ABC$ :

$$\tan A = \frac{3}{5}$$

$$\angle A = \tan^{-1}\left(\frac{3}{5}\right)$$

$$\therefore \angle BAC = 30.963756^\circ$$

\* In  $\triangle ABD$ :

$$\tan A = \frac{4+3}{5}$$

$$\angle A = \tan^{-1}\left(\frac{7}{5}\right)$$

$$\therefore \angle BAD = 50.46232^\circ$$

$$* \angle CAD = \angle BAD - \angle BAC$$

$$= \tan^{-1}\left(\frac{7}{5}\right) - \tan^{-1}\left(\frac{3}{5}\right)$$

$$= 23.498565^\circ$$

$$\approx 23^\circ$$



### Question 7:

A rectangular painting is to be submitted in an Art show. Its perimeter must be less than 4.5 metres and the artist wants its length to be 150 centimetres longer than its width.

- (a) Let  $x$  be the width of the painting in metres. Form an inequation using all the given data. 1

$$2x + 2(x + 150) < 4.5 \times 100$$

$$2x + 2x + 300 < 450$$

$$4x + 300 < 450$$

- (b) Solve this inequation and find the possible dimensions of the painting if all the measurements must be to the nearest 5 centimetres. 2

$$2x + 2x + 300 < 450$$

$$4x < 150$$

$$x < 37.5 \text{ cm}$$

$$* \text{ Width } < 35 \text{ cm}$$

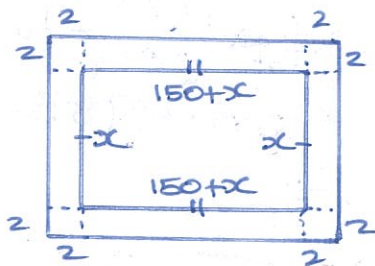
$$* \text{ Length } < 185 \text{ cm}$$

- (c) Can the artist use a 2 centimetre wide frame around the rectangular painting and still satisfy the perimeter requirement? Justify how you arrived at your answer. 3

$$\text{Width} = x + 4$$

$$\begin{aligned} \text{Length} &= x + 150 + 4 \\ &= x + 154 \end{aligned}$$

$$\begin{aligned} \therefore P &= 2(x + 4 + x + 154) \\ &= 2(2x + 158) \\ &= 4x + 316 \end{aligned}$$



\* Frame adds 16 cm to perimeter.

$$\begin{aligned} \therefore P &= 440 + 16 \\ &= 456 \text{ cm} \end{aligned}$$

Hence!

$$456 > 450$$

SO, the frame cannot be used.

End of Assessment