3 course

Name: _____

Teacher: _____

Sydney Technical High School

2023 | YEAR 10
Term 2 ASSESSMENT

MATHEMATICS

General Instructions

- ***Working Time – 90 minutes***
- Write using black or blue pen
- Full marks may not be awarded for careless work or illegible writing
- ***Begin each question on a new page***

Total marks: 60

Section 1 Q I — 10 (10 marks)

- Use Multiple Choice Answer Sheet provided
- Allow about 15 minutes for this section

Question II Q 11 — 15 (50 marks)

- Use answer booklet provided
- Allow about 75 minutes for this section

Section 1 Multiple Choice

Circle the letter of your choice on the Multiple Choice Answer sheet provided.

You should spend about 15 minutes on this section.

1. A fair dice is rolled 3 times. The probability that the sum of the three throws equals 18 is:

A) $\frac{1}{216}$ B) $\frac{1}{72}$ C) $\frac{1}{36}$ D) $\frac{1}{18}$

2. The number added to $x^2 - x$ to complete the square is

A) 1 B) $\frac{1}{2}$ C) $\frac{1}{4}$ D) $-\frac{1}{2}$

3. Jason chooses one meal from each of the following courses, however he is not vegetarian and doesn't like oysters.

Entrees: Prawns, Oysters, Calamari
Mains: Pork, Lamb, Vegetarian, Chicken
Desserts: Ice Cream, Custard

The number of possible 3 course meals George can choose is

A) 24 B) 18 C) 12 D) 6

4. What would be the value of x for this two-way table?

A) 47

B) 77

C) 99

D) 101

	Child	Adult	Total
Male	52		86
Female		43	
Total	x		178

5. The reason why $x^2 - 8x + 16 = 0$ has one solution is that:

A) $\Delta < 0$ B) $\Delta > 0$ C) 8 is half of 16 D) $\Delta = 0$

6. Which statement is correct?

A) Taxable Income = Total Income – Deductions

B) Net Pay = Gross Pay + Tax

C) Annual Gross Salary $\div 52\frac{1}{7} =$ Net Weekly Pay

D) Holiday Pay = $17\frac{1}{2}\%$ of 4 weeks pay

7. A football is sold for \$49. The cost price before GST of 10% is:

A) \$44.10 B) \$44.55 C) \$53.90 D) \$53.45

8. (6,5) is the midpoint of $(x, 2)$ and $(-7, y)$. The values of x and y are:

A) $x = 19$, $y = 3$ B) $x = 13$, $y = 8$ C) $x = 5$, $y = 1$ D) $x = 19$, $y = 8$

9. \$10000 is invested at a compound interest rate of 10.4% p.a for 7 years compounded annually. The compound interest earnt would be

A) \$19988.65 B) \$7280 C) \$17280 D) \$9988.65

10. The solutions to $(x - 2 + \sqrt{3})(x - 2 - \sqrt{3}) = 0$ are:

A) $x = -2 \pm \sqrt{3}$ B) $x = -\sqrt{3} \pm 2$

C) $x = 2 \pm \sqrt{3}$ D) $x = \sqrt{3} \pm 2$

Section 2 (50 marks)

All answers and working are to be done in the answer booklet provided.

You must show all necessary working.

Start each question on a new page.

Allow approximately 75 minutes on this section.

Question 11 (10 marks) **Marks**

a) Solve $3x^2 - 1200 = 0$ 2

b) A card is selected from a standard pack of 52 playing cards. What is the probability that the card is black or a two? 2

c) Find the equation of the line passing through (2, -1) and parallel to the y axis. 1

d) Use the simple interest formula to calculate the simple interest earned on an investment of $1200 at 4% p.a for 6 years. 1

e) Tiffany is trying to decide between two brands of dog food: 2

Brand A: $5.99 for 100g
Brand B: $17.25 for 375g

Which brand is the best buy? Justify your answer.

f) Solve the quadratic equation $x^2 - 11x + 28 = 0$ 2

Question 12 **(10 marks)** **Marks**

a) Of 20 musicians surveyed to find out whether they play the violin or the piano, 8 play the violin, 10 play the piano and 4 play both instruments.

(i) Draw a Venn Diagram including the rectangle in your answer booklet representing the above information. 1

Find the probability,

(ii) they do not play an instrument 1

(iii) they play the violin given that they play the piano. 1

b) Use the general quadratic formula to solve $2x^2 - 8x + 3 = 0$ and leave your answer as a simplified surd. 3

c) Find the distance

(i) distance 1

(ii) midpoint 1

(iii) gradient 1

between the two points P(2, 5) and Q(-4,-3)

(iv) The line passing through the points has a y intercept of $2\frac{1}{3}$. 1
Find the equation of this line.

Question 13 **(10 marks)** **Marks**

a) Use the income tax table below to answer the following questions.

Resident tax rates 2022-23

Taxable income	Tax on this income
0 - $18,200	Nil
$18,201 - $45,000	19 cents for each $1 over $18200
$45,001 - $120,000	$5,092 plus 32.5 cents for each $1 over $45,000
$120,001 - $180,000	$29,467 plus 37 cents for each $1 over $120,000
$180,001 and over	$51,667 plus 45 cents for each $1 over $180,000

Last financial year Peter had a gross income of $67560 and $985 of work related expenses. Find Peter's

(i) taxable income 1

(ii) tax payable 2

(iii) Medicare levy (2% of taxable income) 1

(iv) Peter's employer has sent $14250 in tax to the ATO. Determine whether Peter will have a tax refund or liability and calculate how much it is. Include the Medicare Levy in your calculations. 2

b) Harry deposited $970 into a savings account earning 6% p.a compound interest, compounded annually.

(i) Find the account balance at the end of 7 years. 2

(ii) If the interest had been compounded quarterly, how much more would he have received? 2

Question 14 **(10 marks)** **Marks**

a) A new car was bought for \$58000. After 13 years it had depreciated to a value of \$14000. Find the annual rate of depreciation as a percentage. 2

b) Marion's total holiday pay for four weeks including $17\frac{1}{2}\%$ holiday loading was \$6800. Find her weekly pay. 2

c) Tommy worked a total of 27 hours last week including 5 hours at time and a half and 4 hours at double time. If his regular hourly rate of pay is \$17.50, find his total income for last week. 2

d) Find the equation of the line which is parallel to $y = 2x - 3$ and passes through $(0, 1)$. 2

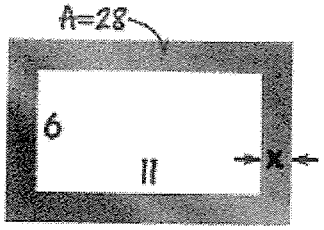
e) A tent with an original price of \$179 is marked down by 30%. It is then reduced by a further 20% during a final clearance sale.

(i) Find its selling price 1

(ii) Find the overall percentage reduction from the original price. 1

Question 15 **(10 marks)** **Marks**

a) Your company is going to make frames as part of a new product they are launching. The frame will be cut from a piece of steel and the final area will be 28cm^2. The inside of the frame must be 11cm by 6cm. Let the thickness of the frame be $x$cm.



(i) Write a quadratic equation to represent this information. 2

(ii) Solve it to find the value of x. 3

b) Evaluate $\frac{10!}{8!} \times \frac{10!}{12!}$ giving your answer as a simplified fraction. 1

c) $100000 is invested for 10 years at 6% p.a. compounded monthly.

(i) Find the total percentage increase in the investment correct to one decimal place. 2

(ii) Find the simple interest rate p.a. that would deliver the same overall interest at the end of the 10 years. Round off your answer correct to one decimal place. 2

THE END

Student Name: _____ Teacher Name: _____

2023 Year 10 Task 2 Solutions

Section 1 M/C

1. $P(6,6,6 = 18)$
$= \frac{1}{6} \times \frac{1}{6} \times \frac{1}{6}$
$= \frac{1}{216}$
A

2. $x^2 - x + (-\frac{1}{2})^2$
$= \frac{1}{4}$
C

3. $2 \times 3 \times 2$
$= 12$
C

4. D 5. D 6. A 7. B

8. $\frac{x + -7}{2} = 6$
$x = 19$
D

$5 = \frac{2+y}{2}$
$y = 8$

9. $10000(1 + \frac{10 \cdot 4}{100})^7$
D

10. $x = 2 \pm \sqrt{3}$
C

Section 2

11.a. $3x^2 - 1200 = 0$
$3(x^2 - 400) = 0$
$x^2 = 400$
$x = \pm\sqrt{400}$
$x = \pm 20$

b. 26 black plus 2 red 2's
$P(\text{black or } 2) = \frac{28}{52}$
$= \frac{7}{13}$

c. Line is vertical
$\therefore x = 2$

d. $S.I. = \frac{1200 \times 4 \times 6}{100}$
$= \$288$

e. Brand B costs \$4.60 for 100g $\therefore$ Best buy

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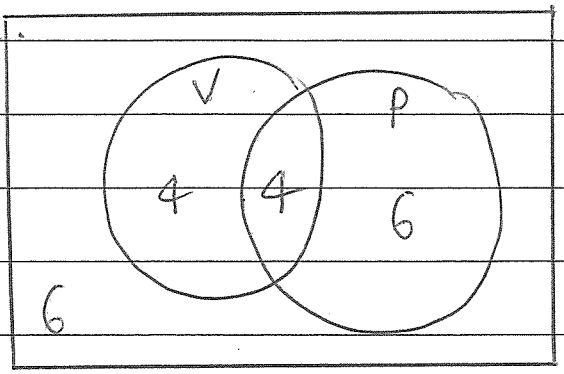
f. $x^2 - 11x + 28 = 0$

$(x-7)(x-4) = 0$

$x = 7$ or 4

12.

(i)



(ii) $P(\text{no instrument}) = \frac{6}{20}$

$= \frac{3}{10}$

(iii) $P(\text{violin/piano}) = \frac{4}{10}$

$= \frac{2}{5}$

b. $2x^2 - 8x + 3 = 0$

$x = \frac{8 \pm \sqrt{8^2 - 4 \times 2 \times 3}}{2 \times 2}$

$x = \frac{8 \pm \sqrt{40}}{4}$

$= \frac{8 \pm 2\sqrt{10}}{4}$

$x = \frac{4 \pm \sqrt{10}}{2}$

c. (i) $d = \sqrt{(-4-2)^2 + (-3-5)^2}$

$= \sqrt{36 + 64}$

$= 10$

(ii) $M = \left(\frac{2 + -4}{2}, \frac{5 + -3}{2}\right)$

$= (-1, 1)$

(iii) $m = \frac{-3-5}{-4-2}$

$= \frac{-8}{-6}$

$m = \frac{4}{3}$

(iv) $y = \frac{4}{3}x + 2\frac{1}{3}$ from $y = mx + b$

or

$3y = 4x + 7$

$0 = 4x - 3y + 7$

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13a(i) Taxable Income
$= \$67560 - 985$
$= \$66575$

(ii) Tax
$= 5092 + (66575 - 45000) \times 0.325$
$= \$12103.88$

(iii) Medicare Levy
$= 2\%$ of 66575
$= \$1331.50$

(iv) Tax Payable + Medicare
$= \$13435.38$
$\therefore$ Refund $= 14250 - 13435.38$
$= \$814.62$

b. Quarterly is 1.5%
7 years $= 28$ quarters.

(i) $A = 970\left(1 + \frac{6}{100}\right)^7$
$= \$1458.52$

(ii) $A = P\left(1 + \frac{r}{100}\right)^n$
$= 970\left(1 + \frac{1.5}{100}\right)^{28}$
$A = \$1471.71$
$\therefore$ Receives \$13.19 extra

14. a. $A = P\left(1 - \frac{r}{100}\right)^n$
$14000 = 58000\left(1 - \frac{r}{100}\right)^{13}$
$\left(\frac{14}{58}\right)^{\frac{1}{13}} = 1 - \frac{r}{100}$
$\frac{r}{100} = 1 - 0.896\ldots$
$r = 10.36\%$ or 10.4%

b. $4W + 17\frac{1}{2}\% = 6800$
$1.175W = 6800$
$4W = 5787.23$
$\therefore$ Weekly Pay $= \$1446.81$

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c. $27 - 9 = 18$ regular hours

$\text{Pay} = 18 \times 17.50 + 5 \times 1.5 \times 17.50 + 4 \times 2 \times 17.50$

$= \$586.25$ is his total income.

d. parallel $\Rightarrow m = 2$

$y = 2x + b \quad b = 1$

$\therefore y = 2x + 1$

$0 = 2x - y + 1$

in general form.

e. (i) $179 \times \frac{0.7}{1} \times \frac{0.8}{1}$

$= \$100.24$

(ii) Reduction $= \$78.76$

$\frac{78.76}{179} \times 100 = 44\%$ reduction

15. $(11 + 2x)(6 + 2x) - 6 \times 11 = 28$

$66 + 22x + 12x + 4x^2 - 66 = 28$

$4x^2 + 34x - 28 = 0$

$2x^2 + 17x - 14 = 0$

+	17
×	-28

$x = \frac{-17 \pm \sqrt{17^2 - 4 \times 2 \times -14}}{4}$

$= \frac{-17 \pm \sqrt{401}}{4}$

$x = \frac{-17 + \sqrt{401}}{4}$ since $x > 0$

b. $\frac{10!}{8!} \times \frac{10!}{12!}$

$10 \times 9 \times \frac{1}{11 \times 12}$

$= \frac{90}{132}$

$= \frac{15}{22}$

c. (i) $\left(1 + \frac{0.5}{100}\right)^{120}$

$= 1.819$

$= 81.9\%$ increase

(ii) Interest

$= 81939.67$

$S.I. = \frac{P \times r \times n}{100}$

$81939.67 = \frac{100000 r \times 10}{100}$

$r = 8.2\%$