

Name _____

Maths Teacher _____

SOLUTIONS

Year 10 2024 Mathematics Standard

TASK 3: Question Bank

General Instructions

- No reading time
- Working time – 50 minutes
- Show all necessary working / units
- NESA approved calculators are allowed
- Exam guidelines:
 - ✓ Use black pen for your working.
 - ✓ Use a pencil and ruler for diagrams.
 - ✓ Marks may be lost for poorly organised written work.

Total Marks – 40

Section 1: 18 marks
Allow about 25 minutes

Section 2: 11 marks
Allow about 12 ½ minutes

Section 3: 11 marks
Allow about 12 ½ minutes

	Trigonometry	Finance	Probability	Total
Section 1	_____ / 18			
Section 2		_____ / 11		
Section 3			_____ / 11	
				/ 40

Section 1 – Trigonometry

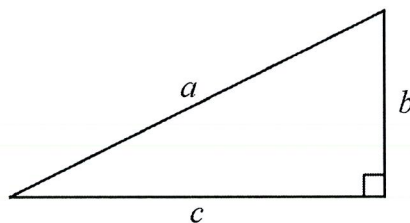
Attempt all questions

Allow approximately 25 minutes for this section

Multiple Choice

Using the **Multiple Choice answer sheet** at the back of the paper, clearly indicate your final answer for each question.

- 1 Which statement is true for the given diagram?

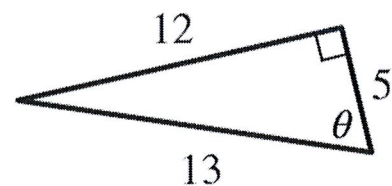


- A $c^2 = a^2 + b^2$ **B** $a^2 = b^2 + c^2$ C $b^2 = a^2 + c^2$
D $a^2 = b^2 - c^2$ E $a^2 = c^2 - b^2$

- 2 If $\sin 40^\circ = \frac{6}{x}$, then:

- A $x = \frac{\sin 40^\circ}{6}$ B $x = 6 + \sin 40^\circ$ C $x = \frac{1}{6 \sin 40^\circ}$
☒ **D** $x = \frac{6}{\sin 40^\circ}$ ☐ E $x = 6 \sin 40^\circ$

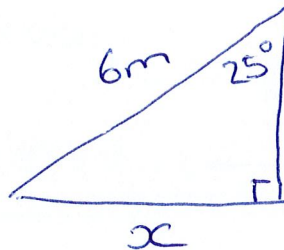
- 3 The value of θ in this diagram is closest to:



- A 23° B 25° C 43°
D 65° **E** 67°

- 4 A 6 metre long ladder makes an angle of 25° with the wall. The distance from the base of the ladder to the wall it is closest to is:

A 1 m B 1.5 m C 2 m
 D 2.5 m E 3 m



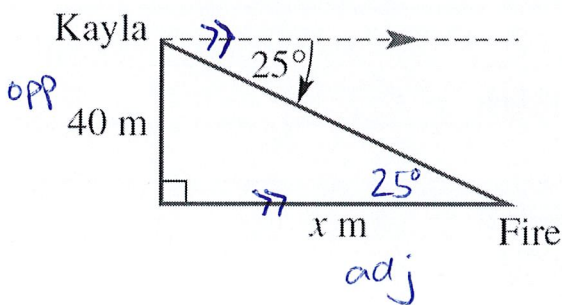
$$\sin 25 = \frac{x}{6}$$

Section 1 Short Response

Answer the questions in the spaces provided. Your responses should include relevant mathematical reasoning and/or calculations.

- 5 From a lookout tower, Kayla spots a bushfire at an angle of depression of 25° . If the lookout tower is 40 m tall, how far away (to the nearest metre) is the bushfire from the base of the tower?

2 marks



$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan 25 = \frac{40}{x}$$

$$x \tan 25 = 40$$

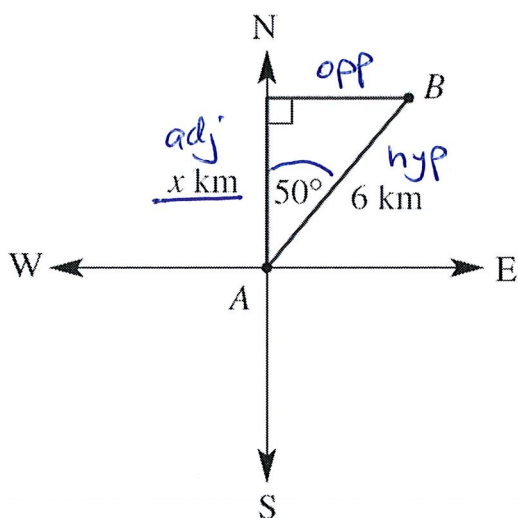
$$x = \frac{40}{\tan 25}$$

$$= 85.78 \dots$$

$$\approx 86 \text{ m} \quad \checkmark$$

- 6 A bushwalker walks 6 km on a bearing of 050°T from point A to point B. Find how far north point B is from point A, correct to two decimal places

2 marks



$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$

$$\cos 50 = \frac{x}{6} \quad \checkmark$$

$$6 \times \cos 50 = x$$

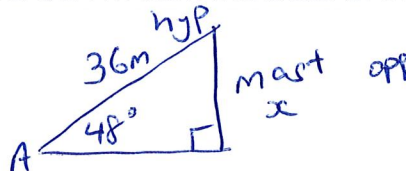
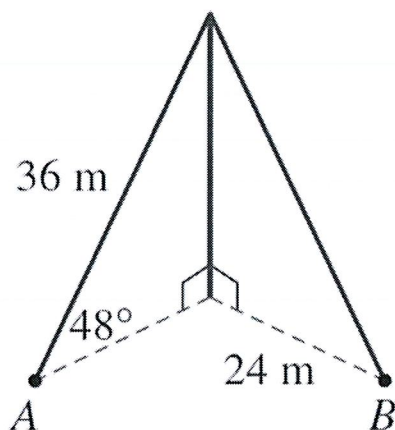
$$x = 3.8567 \dots$$

$$\approx 3.86 \text{ km} \quad \checkmark$$

- 7 A vertical mast is supported at the top by two cables reaching from two points, A and B. The cable reaching from point A is 36 m long and is at an angle of 48° to the horizontal. Point B is 24 m from the base of the mast.

Find the height of the mast.

2 marks



$$\sin \theta = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 48 = \frac{x}{36} \quad \checkmark$$

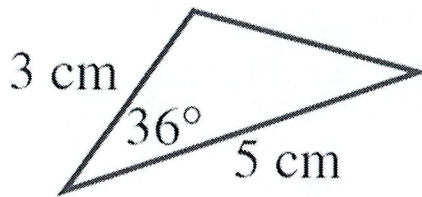
$$36 \times \sin 48 = x$$

$$26.7532 \dots = x$$

$$27 \text{ m} \approx x \quad \checkmark$$

- 8 Show that the area of this triangle is 4.4cm^2 , to one decimal place

1 mark



$$A_{\Delta} = \frac{1}{2} ab \sin C$$

$$= \frac{1}{2} \times 5 \times 3 \times \sin 36$$

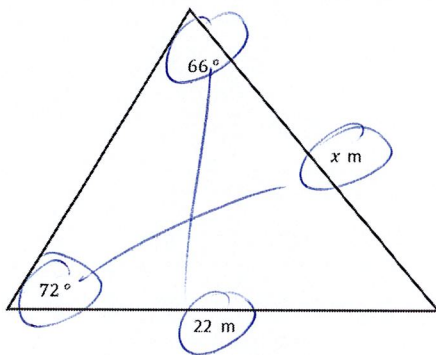
$$= 4.4083...$$

$$\approx 4.4\text{cm}^2$$

- 9 Find the value of x in each of the following triangles, correct to two decimal places.

4 marks

a



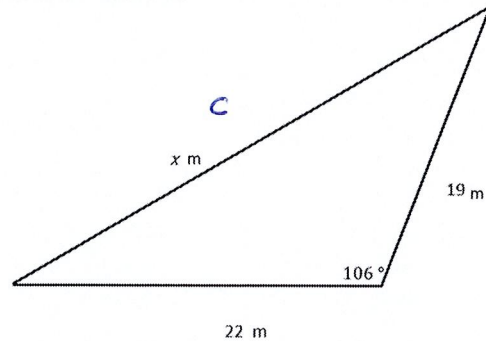
$$\frac{x}{\sin 72} = \frac{22}{\sin 66} \quad \checkmark$$

$$x = \frac{22}{\sin 66} \times \sin 72$$

$$= 22.9033...$$

$$\approx 22.90\text{m} \quad \checkmark$$

b



$$c^2 = a^2 + b^2 - 2ab \cos C$$

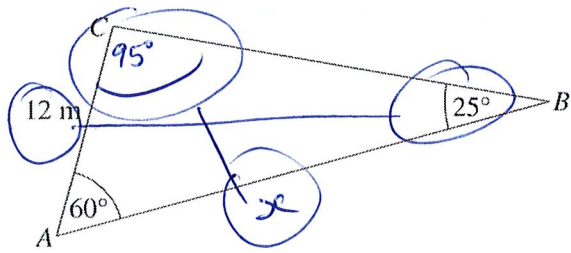
$$\checkmark x^2 = 22^2 + 19^2 - 2 \times 22 \times 19 \times \cos 106$$

$$x = \sqrt{\text{ans}}$$

$$= 32.79379...$$

$$\approx 32.79\text{m} \quad \checkmark$$

- 10 Calculate the length of side AB in the following triangle, to the nearest metre
3 marks



$$180 - 25 - 60 = 95$$

$$\therefore \angle ACB = 95^\circ \quad \checkmark$$

$$\frac{x}{\sin 95} = \frac{12}{\sin 25} \quad \checkmark$$

$$x = \frac{12}{\sin 25} \times \sin 95$$

$$= 28.286 \dots$$

$$\approx 28 \text{ m} \quad \checkmark$$

Section 2 commences overleaf

Section 2 – Finance

Attempt all questions

Allow approximately 12 ½ minutes for this section

Multiple Choice

Using the **Multiple Choice answer sheet** at the back of the paper, clearly indicate your final answer for each question.

- 1 A real estate agent's commission is 2.5% of \$850 000 (the house price). This is:

☒ A \$21 250 B \$17 000 C \$212 500
D \$21 000 E \$2 125

- 2 \$70 000 is invested at 8% p. a. compounded annually. Let FV be the future value of the investment after n years. A rule connecting FV and n is:

A $FV = 70\,000 \times 1.8^n$ B $FV = 70\,000 \times 0.08^n$ C $FV = 70\,000 \times 0.92^n$
☒ D $FV = 70\,000 \times 1.08^n$ E $FV = 70\,000 \times 0.8^n$

- 3 In a given rostered fortnight, Bilal works the following number of 8-hour shifts:

- three day shifts (\$42.40 per hour)
- three afternoon shifts (\$49.36 per hour)
- five night shifts (\$67.12 per hour).

His total income for the fortnight is:

☒ A \$4 887.04 B \$1 457.34 C \$1 000
D \$168.84 E \$1 221.76

- 4 Frankie normally earns \$1 200 per week. She takes 3 weeks of annual leave, to which she is entitled leave loading of 17.5%

How much is Frankie's leave loading for this annual leave?

- A \$210 B \$420 C \$630
D \$1 410 E \$4 230

Section 2 Short Response

Answer the questions in the spaces provided. Your responses should include relevant mathematical reasoning and/or calculations.

- 5 Laura signs a full-time employment contract, paying a gross salary of \$62 000 per year.

Using the table below, calculate how much income tax Laura would expect to pay over one year. (Do not consider the Medicare Levy)

2 marks

Taxable Income	Tax On This Income
0 to \$18,200	Nil
\$18,201 to \$45,000	19c for each \$1 over \$18,200
\$45,001 to \$200,000	\$5,092 plus 30% for each \$1 over \$45,000
\$200,001 and over	\$51,592 plus 45c for each \$1 over \$200,000

$$= 5092 + 0.3 \times (62000 - 45000) \quad \checkmark$$

$$= \$10\,192 \quad \checkmark$$

- 6 Dylan wants to buy a new car. He borrows \$13 900 at 6.75% p.a. simple interest for 6 years.

Calculate the total simple interest paid by Dylan over the 6 years.

2 marks

$$\begin{aligned} I &= P r n \\ &= 13\,900 \times 0.0675 \times 6 \checkmark \\ &= \$5\,629.50 \checkmark \end{aligned}$$

- 7 A brand new car is originally purchased for \$40 000. 8 years later, it is said to have lost half its value.

Calculate its annual depreciation rate as a percentage, to two decimal places.

3 marks

$$\begin{aligned} S &= V_0 (1-r)^n \\ 20\,000 &= 40\,000 \times (1-r)^8 \quad \checkmark \text{ or equivalent ratio of } S \text{ to } V_0. \\ 0.5 &= (1-r)^8 \\ \sqrt[8]{0.5} &= 1-r \quad \checkmark \\ -0.082995 &= -r \\ 0.082995 &= r \\ 8.2995\% &= r \\ 8.30\% &\div r \quad \checkmark \end{aligned}$$

Section 3 commences overleaf

Section 3 – Probability

Attempt all questions

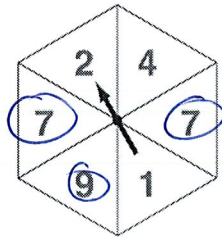
Allow approximately 12 ½ minutes for this section

Multiple Choice

Using the **Multiple Choice answer sheet** at the back of the paper, clearly indicate your final answer for each question.

1

The diagram shows a spinner.



The arrow is spun and will stop in one of the six sections.

What is the probability that the arrow will stop in a section containing a number greater than 4?

- A. $\frac{2}{5}$
- B. $\frac{2}{3}$
- C. $\frac{1}{3}$
- ☒ D. $\frac{1}{2}$

2

A group of 347 people was tested for flu and the results were recorded. The flu test results are not always accurate.

	Test results		Total
	Test indicated flu	Test did not indicate flu	
People with flu	72	3	75
People without flu	16	256	272
	88	259	347

A person is selected at random from the tested group.

What is the probability that their test result is accurate, to the nearest per cent?

- A. 21%
- B. 22%
- ☒ C. 95%
- D. 96%

3

Each time she throws a dart, the probability that Mary hits the dartboard is $\frac{2}{7}$.

She throws two darts, one after the other.

What is the probability that she hits the dartboard with both darts?

- A. $\frac{1}{21}$
- B. $\frac{4}{49}$**
- C. $\frac{2}{7}$
- D. $\frac{4}{7}$

4

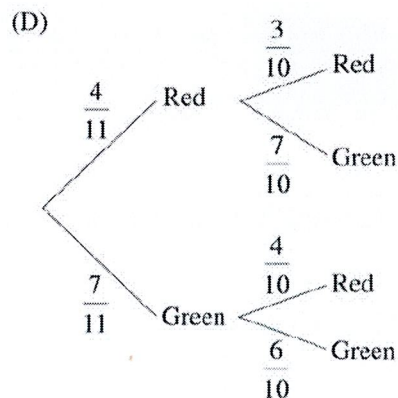
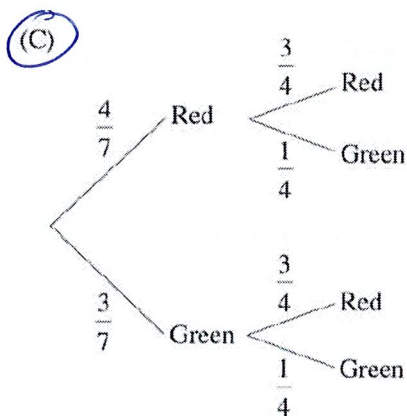
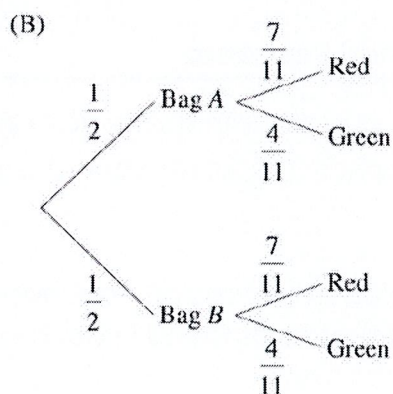
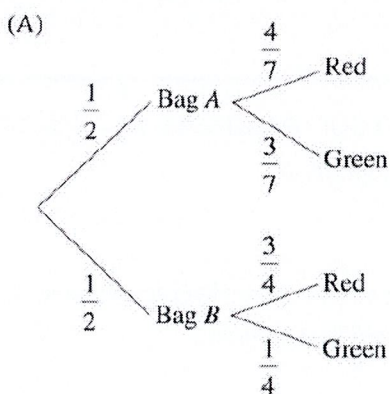
Jaz has 2 bags of apples.

Bag A contains 4 red apples and 3 green apples. $4+3=7$

Bag B contains 3 red apples and 1 green apple. $3+1=4$

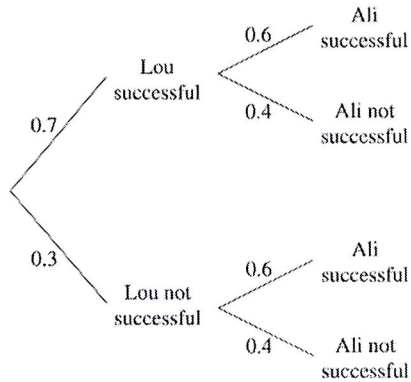
Jaz chooses an apple from one of the bags.

Which tree diagram could be used to determine the probability that Jaz chooses a red apple?



5

Lou and Ali are on a fitness program for one month. The probability that Lou will finish the program successfully is 0.7 while the probability that Ali will finish successfully is 0.6. The probability tree shows this information



What is the probability that only one of them will be successful?

- A. 0.18
- B. 0.28
- C. 0.42
- D. 0.46

Section 3 Short Response

Answer the questions in the spaces provided. Your responses should include relevant mathematical reasoning and/or calculations.

- 6 A factory produced 50 cars, each of which was inspected for faults. The number of faults found in each car was recorded below:

2 marks

Number of faults	0	1	2	3	4
Number of cars	30	12	4	3	1

If the factory director randomly chooses one car, state the probability that it:

- a) Has no faults

$$\frac{30}{50} = \frac{3}{5}$$

$$\approx 0.6$$

$$\approx 60\%$$

- b) Has at least two faults

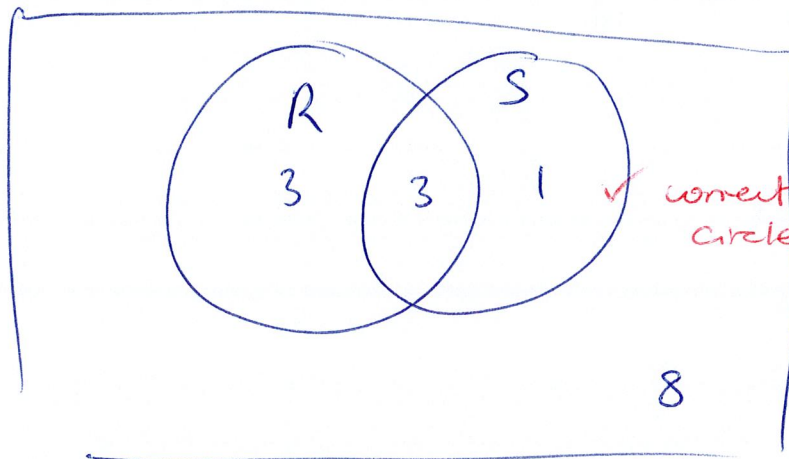
$$\frac{4+3+1}{50} = \frac{8}{50} = \frac{4}{25}$$

$$\approx 0.16$$

$$\approx 16\%$$

- 7 15 people were surveyed about whether they run or swim regularly. 6 mentioned that they regularly run, 4 said that they regularly swim, and 3 said they regularly do both.

By constructing a Venn diagram, determine how many of the 15 surveyed people neither run nor swim.



2 marks

$\therefore$ 8 neither run nor swim ✓

clearly 10 8 as ans.

- 8 Groups of Year 10, Year 12 and university students were surveyed about which European country they would most like to visit. The results were recorded in this two-way table, and some data was accidentally erased:

	France	Spain	Italy	TOTAL
Year 10	75	43	18	136
Year 12	48	42	22	112
University	56	21	25	102
TOTAL	179	106	65	350

a) Complete the two-way table

1 mark

b) The survey company's assistant calls one of the students at random. What is the probability that he calls a Year 12 student who wants to visit Italy?

$$\frac{22}{350} = \frac{11}{175}$$

1 mark

End of assessment

Reference sheet

Trigonometry

$$\sin A = \frac{\text{opp}}{\text{hyp}}, \quad \cos A = \frac{\text{adj}}{\text{hyp}}, \quad \tan A = \frac{\text{opp}}{\text{adj}}$$

$$A = \frac{1}{2}ab \sin C$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$\cos C = \frac{a^2 + b^2 - c^2}{2ab}$$

Financial Mathematics

$$FV = PV(1 + r)^n$$

Declining-balance method of depreciation

$$S = V_0(1 - r)^n$$

Simple Interest

$$I = P r n$$

Name _____

Maths Teacher _____

Year 10 Mathematics Standard 2024 Question Bank: Multiple Choice Answer Sheet*Place a cross (X) to indicate your chosen answer.**If you make a mistake, clearly indicate your final answer.*

ANS .

Section 1: Trigonometry

	A	B	C	D	E
1		X			
2				X	
3					X
4				X	
5					

Section 2: Finance

	A	B	C	D	E
1	X				
2				X	
3	X				
4			X		

Section 3: Probability

	A	B	C	D
1				X
2			X	
3		X		
4			X	
5				X

