



Semester One Examination Question/answer booklet

YR 10 MATHEMATICS EXTENSION

Section One (calculator-free)

Student Name: _____

Time allowed for this section

Reading time before commencing work: 5 minutes
Working time for paper: 40 minutes

Material required/recommended for this section

To be provided by the supervisor

Question/answer booklet for Section One, containing a removable formula sheet which may also be used for Section Two

To be provided by the candidate

Standard items: pens, pencils, pencil sharpener, highlighter, eraser, ruler

Important note to candidates

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

Structure of this paper

	Number of questions available	Number of questions to be attempted	Suggested working time (minutes)	Marks available
Section One Calculator—free	9	9	40 minutes	35
Section Two Calculator—assumed	10	10	80 minutes	65
Total marks				100

Instructions to candidates

1. Answer the questions in the spaces provided.
2. Spare answer pages are provided at the end of this booklet. If you need to use them, indicate in the original answer space where the answer is continued i.e. give the page number.
3. **Show all your working clearly.** Your working should be in sufficient detail to allow your answers to be checked readily and for marks to be awarded for reasoning. Correct answers given without supporting reasoning may not be allocated full marks. Incorrect answers given without supporting reasoning cannot be allocated any marks. If you repeat an answer to any question, ensure that you cancel the answers you do not wish to have marked.
4. It is recommended that you **do not use pencil** except in diagrams.

Section One: Calculator-free**35 marks**

This section has **nine (9)** questions. Attempt **all** questions.

Question 1

The diagram shows the plan of a floor. There is a carpet in the middle of the floor.

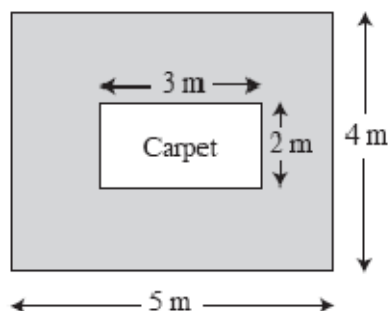


Diagram **NOT**
accurately drawn

Work out the shaded area.

$$\begin{aligned}
 A &= 5 \times 4 - 3 \times 2 \quad \checkmark \\
 &= 20 - 6 \\
 &= 14 \text{ m}^2 \quad \checkmark
 \end{aligned}$$

(2 marks)

Question 2

Simplify each of the following:

(a) $7^0 = 1 \quad \checkmark$

(b) $3^4 \times 3^{-1} = 3^3 = 27 \quad \checkmark$

(c) $\left(125^{\frac{1}{3}}\right)^2 = 5^2 = 25 \quad \checkmark$

(d) $\sqrt[4]{9^8} \div 3^2 = (9^8)^{\frac{1}{4}} \times 3^{-2} = 9^2 \times 9^{-1} = 9 \quad \checkmark$

(e) $\sqrt[3]{0.000216} = 0.06 \quad \checkmark$

(5 marks)

Question 3

(a) Expand

$-p(p^2 - 3p)$

$-p^3 + 3p^2 \quad \checkmark\checkmark$

(b) Factorise fully

$3xy^2 + 15x^2y^3$

$3xy^2(1 + 5xy) \quad \checkmark\checkmark$

(2 marks)

(c) Factorise fully

$-21x^3yz^2 + 35x^2y^3 - 14x^2yz^2$

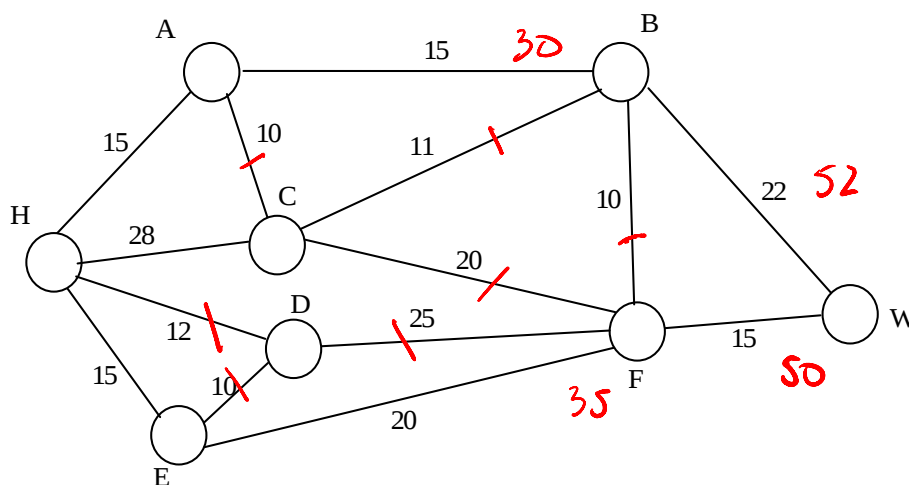
$7x^2y(-3xz^2 + 5y^2 - 2z^2) \quad \checkmark\checkmark$

(2 marks)

(2 marks)

Question 4

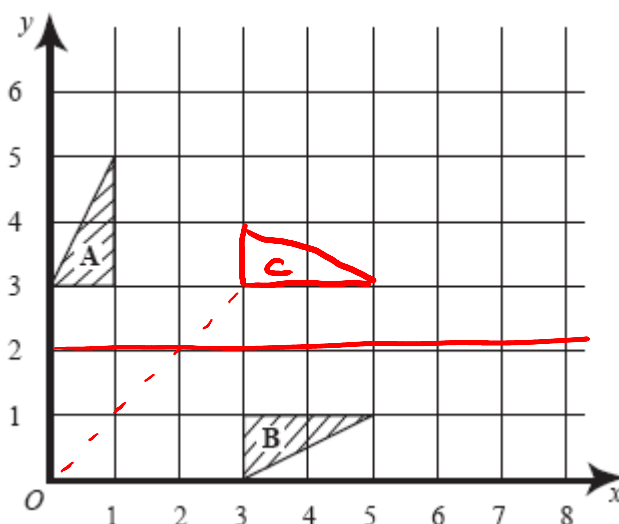
A motorist wishes to travel from home, at H, to work, at W, by the shortest route. The network diagram below shows the distance in kilometres along the various roads. Which route should the motorist take, and how long will it be?

 $H-E-F-W$

50 km

 $\checkmark\checkmark$ $\checkmark$

(3 marks)

Question 5

Triangle **A** and triangle **B** have been drawn on the grid.

- (a) Reflect triangle **B** in the line $y = 2$ Label this image **C**. ✓✓

(2 marks)

- (b) Describe fully the single transformation which will map triangle **B** onto triangle **A**.

Reflect in the line $y = x$ ✓✓

(2 marks)

Question 6

- (a) Work out the value of $1\frac{2}{5} + 8\frac{3}{7} - 4\frac{4}{7}$

Give your answer as a fraction in its simplest form.

$$\begin{aligned}
 1\frac{2}{5} + 8\frac{3}{7} - 4\frac{4}{7} &= 1\frac{2}{5} + 8\frac{3}{7} + 4\frac{4}{7} \quad \checkmark \\
 &= 1\frac{2}{5} + 13 \quad \checkmark \\
 &= 14\frac{2}{5} \quad \checkmark
 \end{aligned}$$

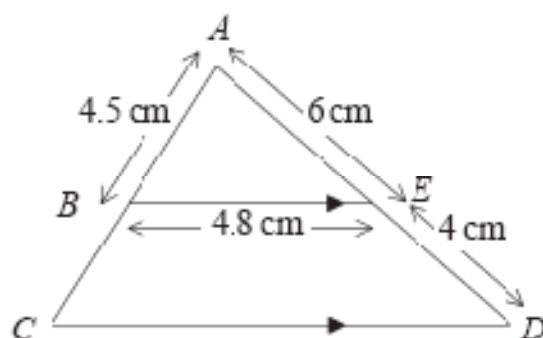
(3 marks)

- (b) Work out the value of $2\frac{2}{5} \times 3\frac{1}{4} \div 16\frac{9}{10}$

Give your answer as a fraction in its simplest form.

$$\begin{aligned}
 \frac{12}{5} \times \frac{13}{4} \div \frac{169}{10} &= \frac{312}{20} \times \frac{10}{169} = \frac{6}{13} \quad \checkmark \quad \checkmark
 \end{aligned}$$

(3 marks)

Question 7Diagram NOT
accurately drawn

BE is parallel to CD . $AE = 6$ cm, $ED = 4$ cm, $AB = 4.5$ cm, $BE = 4.8$ cm.

Calculate the length of CD .

$$\triangle ABE \sim \triangle ACD \quad (AAA)$$

$$\frac{CD}{BE} = \frac{AD}{AE} \quad \bigg| \quad \frac{CD}{4.8} = \frac{10}{6} \quad \bigg| \quad CD = \frac{4.8 \times 5}{3} = 8.0 \text{ cm}$$

(3 marks)

Question 8

The table shows some expressions. a , b , c and d represent lengths. π and 3 are numbers which have no dimensions.

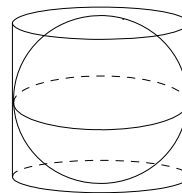
$3a^2$	$\frac{\pi ab^3}{3d}$	πbc	$ac + bd$	$\pi(a + b)$	$3(c + d)^3$	$3\pi bc^2$
✓		✓	✓			

Tick (✓) the boxes underneath the **three** expressions which could represent areas.

(3 marks)

Question 9

A sphere just fits inside a cylinder. Determine the proportion of the volume of the cylinder that is occupied by the sphere. Clearly justify your answer.



$$V_c = \pi r^2 h$$

$$\text{but } h = 2r$$

$$V_c = \pi r^2 \times 2r$$

$$= 2\pi r^3 \quad \checkmark$$

$$V_s = \frac{4}{3} \pi r^3$$

$$\frac{V_s}{V_c} = \frac{\frac{4}{3} \cancel{\pi} \cancel{r^3}}{2 \cancel{\pi} \cancel{r^3}} \quad \checkmark$$

$$= \frac{2}{3} \quad \checkmark$$

(3 marks)

END OF SECTION 1

SEE NEXT PAGE

Spare page for extra working.