# PAPER J

# PRACTICE QUESTIONS

# Mathematics

**DO NOT OPEN THIS BOOKLET UNTIL INSTRUCTED.**

Read the instructions on the **ANSWER SHEET** and fill in your **NAME**, **SCHOOL** and **OTHER INFORMATION**.

Use a pencil. Do **NOT** use a coloured pencil or a pen.

Rub out any mistakes completely.

You **MUST** record your answers on the **ANSWER SHEET**.

Mark only **ONE** answer for each question.

Your score will be the number of correct answers.

Marks are **NOT** deducted for incorrect answers.

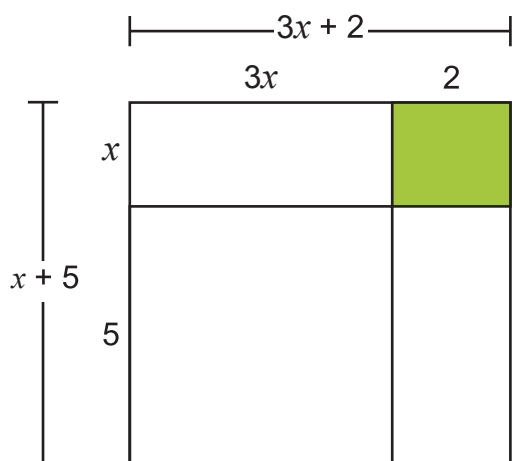There are **5 MULTIPLE-CHOICE QUESTIONS** (1–5).

Use the information provided to choose the **BEST** answer from the four possible options.

On your **ANSWER SHEET** fill in the oval that matches your answer.

You may use a ruler and spare paper.
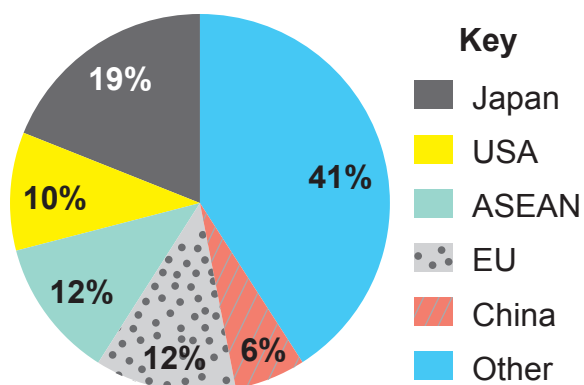
You are **NOT** allowed to use a calculator.

1. The diagram below represents the products of $(x + 5)$ and $(3x + 2)$.



What product is represented by the shaded rectangle?

(A)     $2x$
(B)     $6x$
(C)     $x^2$
(D)     $3x^2$

2. Jules has a package gift-wrapped, as shown.



What is the volume, in cm³, of the package?

(A)       50
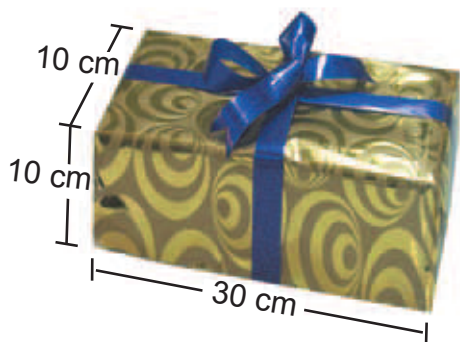(B)      300
(C)     1400
(D)     3000

3. During 2001, Australia exported goods to a total value of \$123 000 million.
The graph shows the percentage of these goods exported to different parts of the world.



**Key**
Japan
USA
ASEAN
EU
China
Other

What was the value, in millions of dollars, of the goods exported to China?

(A)     7 380
(B)   12 300
(C)   14 760
(D)   23 370

4. Jane was tossing a coin, but one side of the coin was weighted more heavily than the other.

Here are the results she obtained.

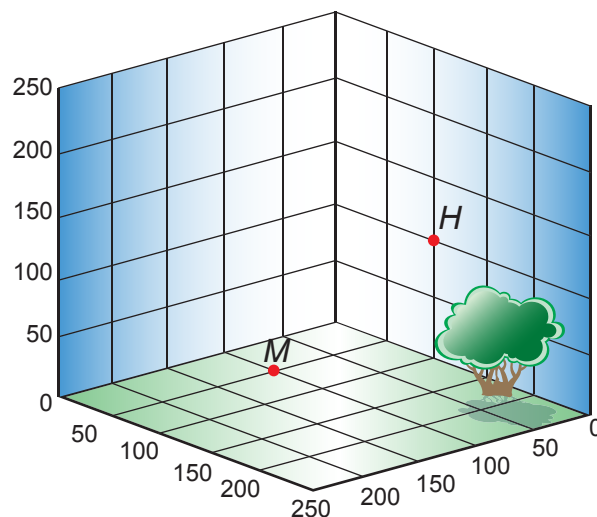| | Heads | Tails |
|---|---|---|
| 100 tosses | 67 | 33 |
| 500 tosses | 286 | 214 |
| 1000 tosses | 581 | 419 |
| 5000 tosses | 2989 | 2011 |

Based on her results, which of these is the best estimate of the probability of getting a head in a single toss of Jane's coin?

(A)    0.4
(B)    0.5
(C)    0.6
(D)    0.7

5.* In the diagram *H* represents the position of a hawk hovering above the ground, and *M* the position of a mouse on the ground.



ALL MEASUREMENTS IN METRES

The mouse moves to a new position *N*, which is 50 m from position *M*.

What is the maximum possible distance, in m, from *H* to the new position *N* correct to the nearest whole number?

* Free response questions are only applicable to some assessments.

**END OF PAPER**

**THIS PAGE MAY BE USED FOR WORKING.**

## HOW TO FILL OUT THIS SHEET:

✏️ **USE A PENCIL**

- Print your details clearly in the boxes provided.
- Make sure you fill in only <u>one</u> oval in each column.
- Rub out all mistakes completely.
- Do not use a coloured pencil or pen.

**EXAMPLE 1:** *Debbie Bach*

FIRST NAME — D E B B I E
LAST NAME — B A C H

**EXAMPLE 2:** *Chan Ai Beng*

FIRST NAME — C H A N
LAST NAME — A I   B E N G

**EXAMPLE 3:** *Jamal bin Abas*

FIRST NAME — J A M A L   B I N
LAST NAME — A B A S

## FIRST NAME to appear on certificate

## LAST NAME to appear on certificate

**Are you male or female?**    ◯ **Male**    ◯ **Female**

**Does anyone in your home usually speak a language other than English?**    ◯ **Yes**    ◯ **No**

**School name:** _____

_____

**Town / suburb:** _____

**Today's date:** _____ / _____ / _____    **Postcode:** _____

**DATE OF BIRTH**

Day    Month    Year

**STUDENT ID** (optional)

**CLASS** (optional)

## TO ANSWER THE QUESTIONS

**MULTIPLE CHOICE**
Questions 1 to 35

**Example:**  4 + 6 =

        (A)    2
        (B)    9
        (C)   10
        (D)   24

The answer is <u>10</u>, so fill in the oval Ⓒ , as shown.

Ⓐ    Ⓑ    ●    Ⓓ

## START

1  Ⓐ    Ⓑ    Ⓒ    Ⓓ

2  Ⓐ    Ⓑ    Ⓒ    Ⓓ

3  Ⓐ    Ⓑ    Ⓒ    Ⓓ

4  Ⓐ    Ⓑ    Ⓒ    Ⓓ

5

| | | |
|---|---|---|
| ⓪ | ⓪ | ⓪ |
| ① | ① | ① |
| ② | ② | ② |
| ③ | ③ | ③ |
| ④ | ④ | ④ |
| ⑤ | ⑤ | ⑤ |
| ⑥ | ⑥ | ⑥ |
| ⑦ | ⑦ | ⑦ |
| ⑧ | ⑧ | ⑧ |
| ⑨ | ⑨ | ⑨ |

SAMPLE

| QUESTION | KEY | SOLUTION | STRAND | LEVEL OF DIFFICULTY |
|----------|-----|----------|--------|---------------------|
| 1 | A | The shaded rectangle has a side of 2 and a side of $x$. Therefore, the product of these two sides is $2x$. | Algebra and Pattern | Easy |
| 2 | D | Volume of a box = length × width × height<br>V = 30 × 10 × 10<br>V = 3000 cm$^3$ | Measurement | Easy |
| 3 | A | 6% of the total products are exported to China.<br>6% of 123 000 million = 0.06 × 123 000 million = \$7380 million | Chance and Data | Easy |
| 4 | C | Experimental Probability equals:<br><br>$\dfrac{\text{Number of times an event has occurred}}{\text{Number of trials}}$<br><br>Applying this formula:<br><br>$\dfrac{67 + 286 + 581 + 2989}{100 + 500 + 1000 + 5000} = 0.59$<br><br>Therefore, the best estimate is 0.6. | Chance and Data | Medium |

Apart from reading 3D coordinates the main mathematics in this question is Pythagoras' Theorem.

If we look at the mouse and the hawk from above we would see this:
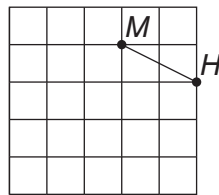


The line shows the hawk's path. The distance along the ground of this path (the horizontal component) is $\sqrt{100^2 + 50^2}$. This is about 111.8 m. The mouse runs 50 m away from the hawk to a new position 'N'. The mouse can run in any direction but wants to maximise the distance from the hawk. This means he should run in the same direction as the line NH in the diagram below.
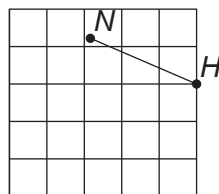


Along the ground this gives a distance of 111.8+50=161.8 m.

This is just the horizontal distance. Fortunately for the mouse, the hawk is further away than that because it is hovering above the ground at a height of 100 m.

We can show this on a new diagram from a different point of view.
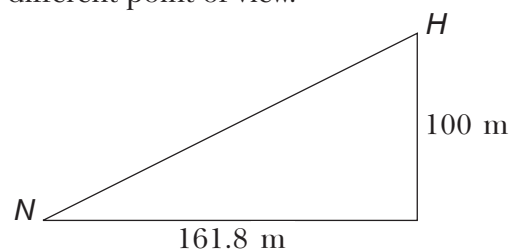


We can now use Pythagoras' Theorem again to find the distance from the hawk to the mouse.

$$\sqrt{161.8^2 + 100^2}$$

This gives an answer of 190.2 m. To the nearest whole number this is 190.

**Comment**

The underlying mathematics in this problem is not very difficult and boils down to two instances of Pythagoras' Theorem. As a problem, though, the question is more difficult. Students have to realise that Pythagoras' Theorem is the appropriate piece of mathematics to use and have to extract information presented in an unusual way. Also some insight is required to understand in what direction the mouse should run.

| 5 | 190 | | Measurement | Hard |

**Level of difficulty** refers to the expected level of difficulty for the question.

**Easy**                       more than 70% of candidates will choose the correct option

**Medium**                     about 50–70% of candidates will choose the correct option

**Medium/Hard**                about 30–50% of candidates will choose the correct option

**Hard**                       less than 30% of candidates will choose the correct option

| THE FOLLOWING YEAR LEVELS SHOULD SIT THIS PAPER | |
| --- | --- |
| **Australia**[1] | Year 12 |
| **Brunei** | Pre-University 2 |
| **Egypt** | Year 12 |
| **Hong Kong** | Form 6 |
| **Indian Subcontinent**[2] | Class 12 |
| **Indonesia** | N/A |
| **Malaysia** | Upper 6 |
| **Middle East**[3] | Class 12 |
| **New Zealand/ Pacific**[4] | Year 13 |
| **Singapore** | Junior College 1 |
| **Southern Africa**[5] | Grade 12 |

**PAPER J**

[1] All international schools registered with UNSW Global (which have an 8-digit school code starting with 46) should sit the papers according to the Australian year levels.
[2] Indian Subcontinent Region: India, Sri Lanka, Nepal, Bhutan and Bangladesh.
[3] Middle East Region: United Arab Emirates, Qatar, Kuwait, Saudi Arabia, Bahrain, Oman, Turkey, Lebanon, Tunisia, Morocco, Libya, Algeria, Jordan and Pakistan.
[4] Pacific Region: Vanuatu, Papua New Guinea and Fiji.
[5] Southern Africa Region: South Africa, Botswana, Lesotho, Swaziland, Zimbabwe and Namibia.

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