Practice Questions

UNSW
THE UNIVERSITY OF NEW SOUTH WALES

eaa
EDUCATIONAL ASSESSMENT AUSTRALIA

INTERNATIONAL COMPETITIONS AND ASSESSMENTS FOR SCHOOLS

MATHEMATICS

STUDENT'S NAME:

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 2B or B pencil.
Do **NOT** use a pen.
Rub out any mistakes completely.

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

There are **3 MULTIPLE-CHOICE QUESTIONS** (1–3).
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.

There is **ONE FREE-RESPONSE QUESTION** (4).
Write your answer in the box provided on the **ANSWER SHEET**.

Your score will be the number of correct answers.
Marks are **NOT** deducted for incorrect answers.

You may use a ruler and spare paper.
A **CALCULATOR** is required.

PLEASE SEE BACK COVER FOR A LIST OF THE YEAR LEVELS THAT SHOULD SIT THIS PAPER

PAPER I

INTERNATIONAL COMPETITIONS AND ASSESSMENTS FOR SCHOOLS

MATHEMATICS

UNSW THE UNIVERSITY OF NEW SOUTH WALES

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HOW TO FILL OUT THIS SHEET: USE 2B OR B PENCIL

- Use 2B or B pencil only.
- Rub out all mistakes completely.
- Print your details clearly in the boxes provided.
- Make sure you fill in only one oval in each column.

EXAMPLE 1: Debbie Bach

FAMILY NAME: BACH

GIVEN NAME: DEBBIE

EXAMPLE 2: Fahrul Asmady bin Abas

FAMILY NAME: ABAS

GIVEN NAME: FAHRUL ASMADY BIN

FAMILY NAME

GIVEN NAME

Are you Male or Female?

○ Male ○ Female

Does anyone in your home usually speak a language other than English?

○ Yes ○ No

TAP I.D. (TAP Schools only) ____ – ____ – ____

School Name: _____

Town / Suburb: _____

Today's Date: ___/___/___ **Postcode:** _____

What is your date of birth?

Day	Month	Year
0 1 2 3	0 1	0 1 2 3 4 5 6 7 8 9

CLASS (Optional)

A B C D E F G H I J K L M N O P

TO ANSWER THE QUESTIONS

MULTIPLE CHOICE
Questions 1 to 3.

Example: 4 + 6 = ?

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

The answer is 10, so fill in the oval Ⓒ as shown.

Ⓐ Ⓑ ● Ⓓ

FREE RESPONSE
Question 4.

Example: 6 + 6 = ?

- The answer is 12, so WRITE your answer in the boxes.
- Write only ONE digit in each box as shown.

	1	2

START

1 Ⓐ Ⓑ Ⓒ Ⓓ

2 Ⓐ Ⓑ Ⓒ Ⓓ

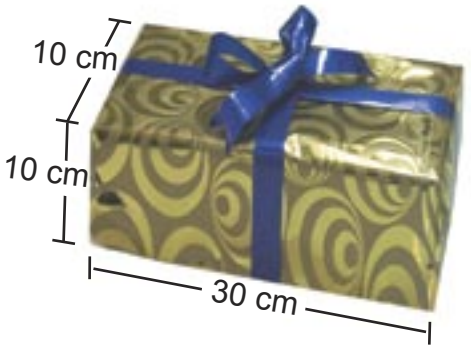
3 Ⓐ Ⓑ Ⓒ Ⓓ

4 | | | |

INTERNATIONAL COMPETITIONS AND ASSESSMENTS FOR SCHOOLS
MATHEMATICS

PAPER I

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



What is the volume, in cm^3, of the package?

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

2. Mai wants to rearrange this formula.

$$d = b^2 - 4ac$$

How should she write the formula to make b the subject?

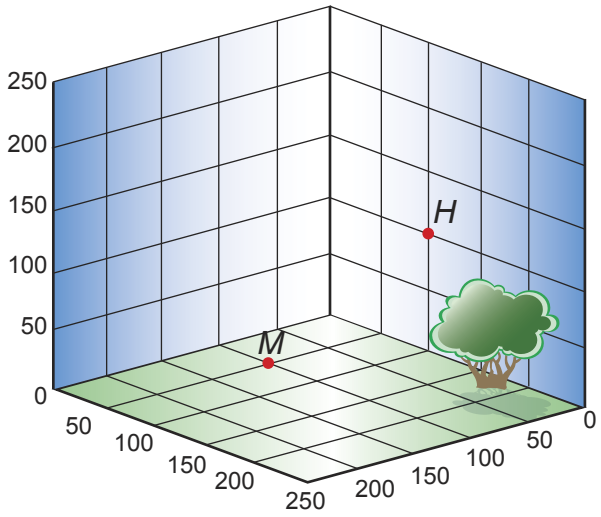
(A) $b = d + \sqrt{4ac}$
(B) $b = d - \sqrt{4ac}$
(C) $b = \pm\sqrt{d - 4ac}$
(D) $b = \pm\sqrt{d + 4ac}$

3. Anna forgot the code of a 3-digit lock on her case (all digits ranging from 0 to 9). She remembers that the first digit was less than 5, the second digit was an odd number, and the third one was either 7 or 8. There were no identical digits in the code.

How many different combinations could possibly open her lock?

(A) 25
(B) 36
(C) 41
(D) 50

4. 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 CENTIMETRES

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

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

(Write only the number on your answer sheet.)

END OF PAPER

THE FOLLOWING YEAR LEVELS SHOULD SIT FOR THIS PAPER:

AUSTRALIA: Year 11
BRUNEI: Pre-University 1
INDONESIA: Year 12
MALAYSIA: Form 5 & Lower 6
NEW ZEALAND: Year 12
PACIFIC: Year 11
SINGAPORE: Sec 4 & 5
SOUTH AFRICA: Grade 11

Question solutions–Paper I

Question 1

Answer key: D
Category: Measurement

Options	*Reasoning for options*
A 50	Incorrect
B 300	Incorrect
C 1400	Incorrect
D 3000	Correct

Difficulty level: Easy. About 80-100% expected correct.

Question 2

Answer key: D
Category: Algebra

Options	*Reasoning for options*
A	Incorrect
B	Incorrect
C	Incorrect
D	Correct $b^2 = d + 4ac$ $b = \pm\sqrt{d + 4ac}$

Difficulty level: Medium. About 31-79% expected correct.

Question 3

Answer key: C
Category: Chance and date

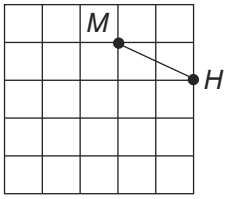
Options	*Reasoning for options*
A 25	Incorrect
B 36	Incorrect
C 41	Correct. First two digits filled 5 × 5 ways, last digit 2 ways BUT must delete 117, 118, 337,338, 077,177,277,377 and 477. 5 × 5 × 2 – 9 = 41
D 50	Incorrect

Difficulty level: Hard. Less than 31% expected correct.

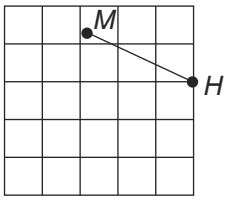
Question 4

Answer key: 190
Category: Measurement

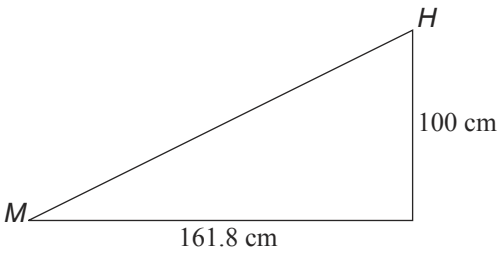
Reasoning
Apart from reading 3-D co-ordinates the main mathematics in this question is Pythagoras' theorem.
If we look at the mouse and the hawk from above we would see this:



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 cm. The mouse runs 50 cm away from the hawk. The mouse can run any way he likes but if he doesn't what to be hawk food he will run in a direction that will get him as far from the hawk as he can. This means he should run in the same direction as the line MH in our diagram is pointing.



Along the ground this gives a distance of 111.8+50=161.8 cm
This is just the horizontal distance. Luckily for the mouse the hawk is further away than that because it is hovering above the ground at a height 100 cm.
We can show this on a new diagram from a different point of view.



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

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

This gives an answer of 190.2 cm. 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 is the appropriate piece of mathematics to use and have to extract infor mation presented in an unusual way. Also some insight is required to understand in what direction the mouse should run.

Difficulty level: Hard. Less than 31% expected correct.