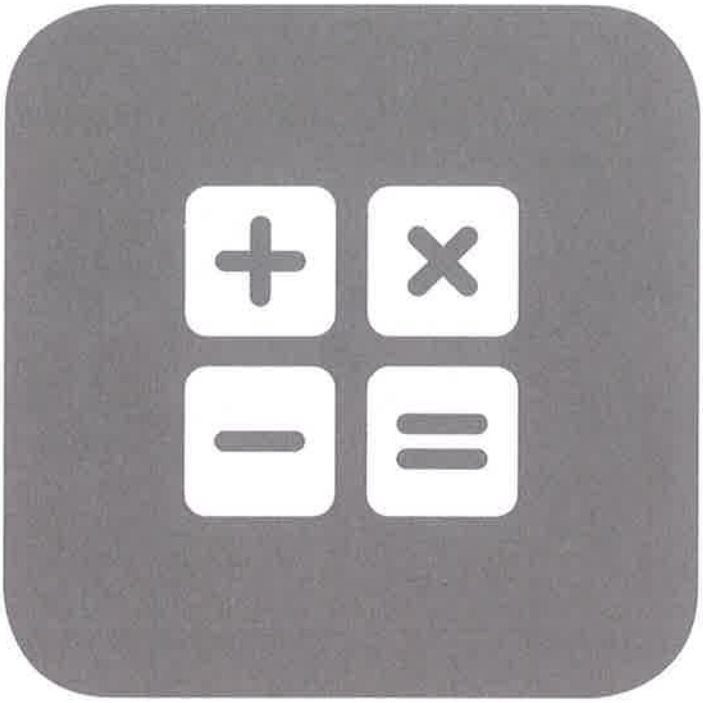
UNSW Global
THE UNIVERSITY OF NEW SOUTH WALES
SYDNEY • AUSTRALIA

PAPER E



2011 ICAS

International Competitions and Assessments for Schools

MATHEMATICS

Educational Assessment Australia
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DO NOT OPEN THIS BOOKLET UNTIL INSTRUCTED.

40 QUESTIONS

TIME ALLOWED: 1 HOUR

STUDENT'S NAME:

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**.

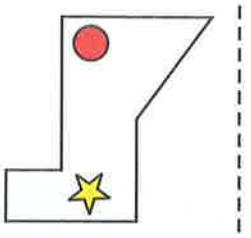
Mark only **ONE** answer for each question.
Your score will be the number of correct answers.
Marks are **NOT** deducted for incorrect answers.

There are **35 MULTIPLE-CHOICE QUESTIONS** (1–35).
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 are **5 FREE-RESPONSE QUESTIONS** (36–40).
Write your answer in the boxes provided on the **ANSWER SHEET** and fill in the ovals that match your answer.

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

1. The diagram shows a figure and a line of reflection.

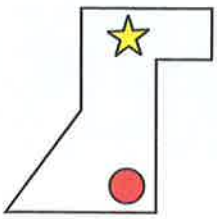


Which of these shows the figure reflected about the line?

(A)

(B)

(C)



(D)

2. What is the missing number?

$2 \times \boxed{?} - 1 = 7$

(A) 6
(B) 4
(C) 3
(D) 2

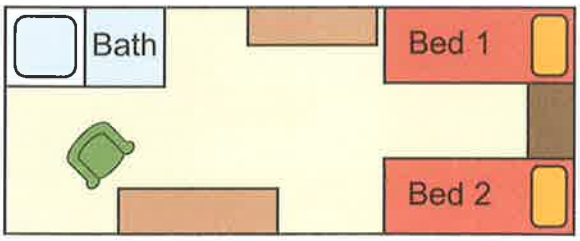
3. Tony has a piece of thin wire 30 cm long.

He bends the wire so that it forms a rectangle. Two sides of the rectangle are 6 cm each.

How long is each of the other sides?

(A) 5 cm
(B) 9 cm
(C) 12 cm
(D) 24 cm

4. Here is the floor plan of a cabin on a cruise ship.



What fraction of the total cabin area do the two beds occupy?

(A) $\frac{2}{3}$
(B) $\frac{1}{3}$
(C) $\frac{2}{9}$
(D) $\frac{1}{9}$

5. Which of the following units of measurement can be used to represent volume?

(A) cm
(B) cm^2
(C) cm^3
(D) cm^4

6. When Olivia weighed herself, the scale showed 58.2 kg. She took off her jacket and the scale showed 56.6 kg.

What was the mass of her jacket?

(A) 1.4 kg
(B) 1.6 kg
(C) 2.4 kg
(D) 2.6 kg

7. A lift is designed to hold 13 people. The average person weighs 75 kg.

What weight is the lift designed to hold?

(A) 975 kg
(B) 965 kg
(C) 775 kg
(D) 765 kg

8. The numbers 4, 6, 10, 18, ... form a number pattern.

Which statement best describes the number pattern starting from the second term?

(A) Each number is eight more than the previous number.
(B) Each number is two less than twice the previous number.
(C) Each number is two more than the previous number.
(D) Each number is eight less than three times the previous number.

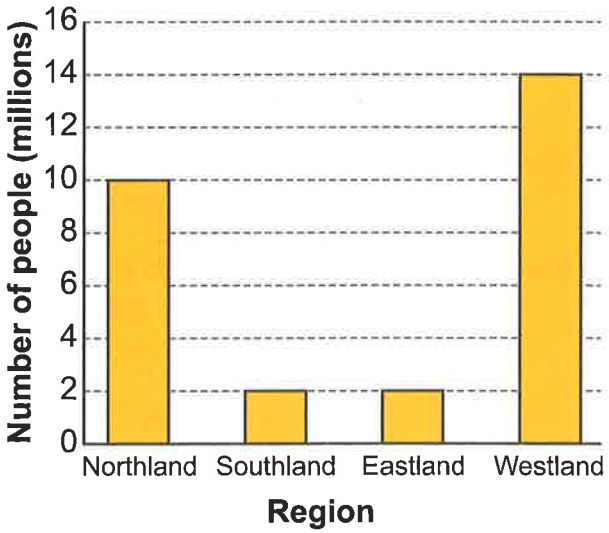
9. The diameters of the planets of our solar system are shown in the table.

Planet	Diameter (km)
Mercury	4 900
Venus	12 100
Earth	12 800
Mars	6 800
Jupiter	143 000
Saturn	120 500
Uranus	51 100
Neptune	49 500

Which planet has a diameter that is larger than the diameter of Earth but smaller than the diameter of Uranus?

(A) Venus
(B) Jupiter
(C) Saturn
(D) Neptune

10. Yara drew this graph to show the population of four regions in her country.



She wants to put the same information in a sector (pie) graph.

What angle should Yara use to represent the population of Westland?

(A) 64°
(B) 90°
(C) 150°
(D) 180°

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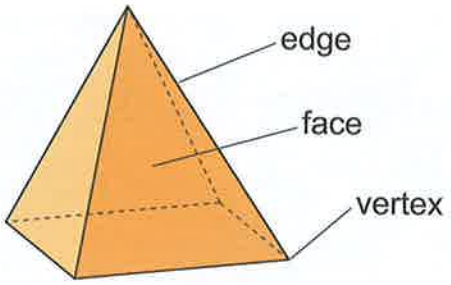
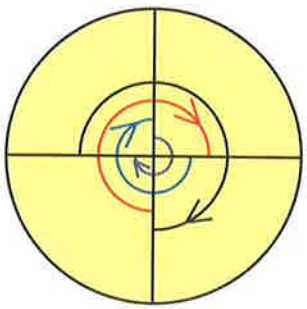
11. A rectangular pyramid has eight edges, five faces and five vertices.



Which of the options shows the number of edges, faces and vertices for a rectangular prism?

	Edges	Faces	Vertices
(A)	4	4	5
(B)	8	6	5
(C)	12	4	8
(D)	12	6	8

12. Tony drew two diameters on a circle. He counted four reflex angles formed by the diameters, as shown.

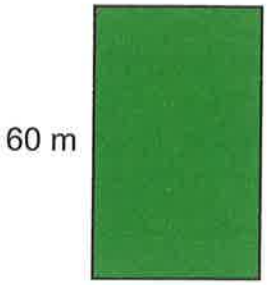


Tony drew another circle, this time with four diameters.

How many reflex angles are formed by the four diameters of the circle?

(A) 12
(B) 16
(C) 24
(D) 48

13. Anish built a fence around this rectangular field.



NOT TO SCALE

He used a fence post every 1.2 metres. He left a space in the fence for a gate measuring 2.4 metres long.

How many fence posts did Anish use?

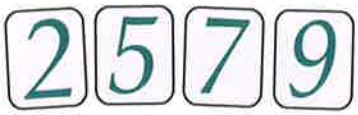
(A) 138
(B) 139
(C) 140
(D) 141

14. What is the missing number in this pattern?

9, 36, 81, 144, ?

(A) 225
(B) 207
(C) 171
(D) 169

15. Anish had these four cards.



He picked two cards at random and then added the numbers on these two cards to get a total.

The total has the greatest chance of being a multiple of:

(A) 2 (B) 3
(C) 4 (D) 7

16. Four students distributed posters around their school.

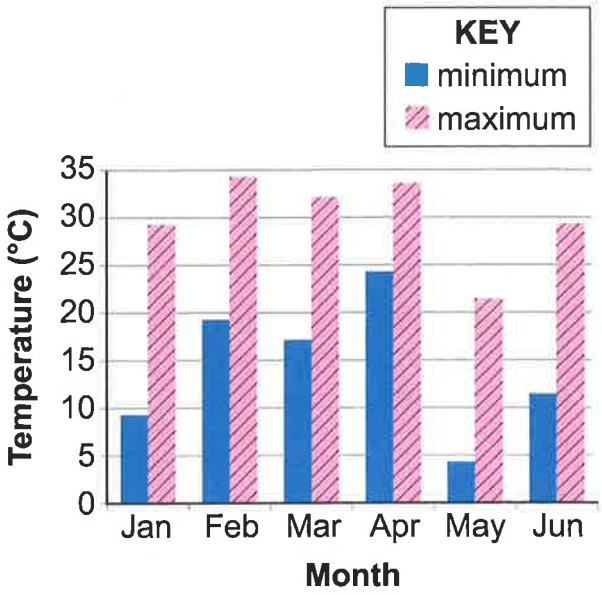
The table shows the fraction of the total number of posters each student distributed.

Student	Fraction of posters distributed
Anish	$\frac{3}{10}$
Jess	$\frac{1}{4}$
Natalia	$\frac{1}{20}$
Tony	$\frac{2}{5}$

Which student distributed the greatest number of posters?

(A) Anish
(B) Jess
(C) Natalia
(D) Tony

17. The column graph shows the minimum and maximum temperatures in Anyland for six months.



Which month has the greatest range in temperature?

(A) Jan (B) Feb
(C) May (D) Jun

18. Jess had 70 flowers and 8 vases.

She put an equal number of flowers in each vase.

Which of these can **NOT** be the number of flowers left over?

(A) 14
(B) 22
(C) 30
(D) 44

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19. A boy and a girl start walking from the same point at the same time. The boy walks at 5 km/h while the girl walks at 7 km/h.

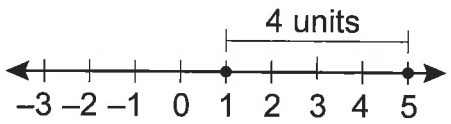
Their pet bird flies back and forth between them at an average speed of 15 km/h.

What distance has the bird flown after two hours?

(A) 12 km
(B) 24 km
(C) 30 km
(D) 54 km

20. The mathematical expression $|M - N|$ describes the distance from M to N along the number line.

For example, if $M = 1$ and $N = 5$, then $|M - N| = 4$.



Anish selected other numbers for M and N and the result of $|M - N|$ was 6.

Which two numbers could Anish have selected?

(A) 4 and 2
(B) 7 and 2
(C) 3 and 9
(D) 3 and 3

21. Jess, Natalia and Yara are jointly making a shirt for their school project.

Jess prepared the sleeves in x hours. Natalia then completed the front and the back in $2x + 1$ hours. After they had finished, Yara took three more hours to attach the sleeves to complete the shirt.

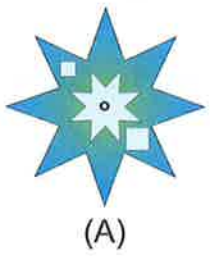
Which expression represents the total number of hours it took to complete the project?

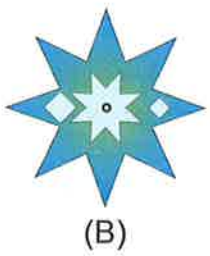
(A) $6x$
(B) $7x$
(C) $2x + 4$
(D) $3x + 4$

22. Anita made this design.

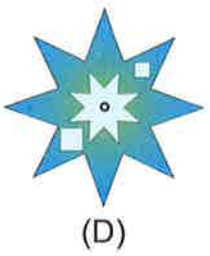
She rotated the design 45° anti-clockwise around its centre. She then rotated it 135° clockwise around its centre.

What did the design look like after the rotations?

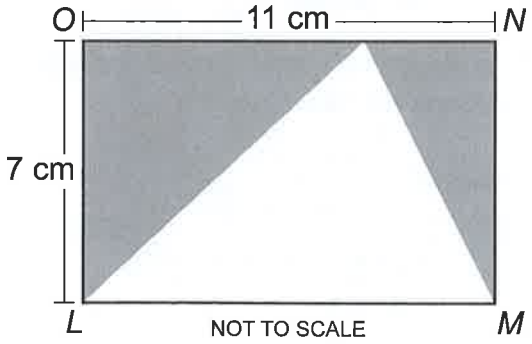

(A)


(B)


(C)


(D)

23. *LMNO* is a rectangle.



What is the area of the shaded part, in cm^2?

(A) 77 (B) $51\frac{2}{3}$

(C) $38\frac{1}{2}$ (D) 36

24. A teacher wishes to store folders upright in a bookcase.

Each folder is 7 cm wide. The bookcase has 3 shelves and each shelf is 1.3 m wide.

How many folders can she store in the bookcase?

(A) 56
(B) 54
(C) 19
(D) 18

25. A cube has five white faces and one black face. The cube is rolled onto a table.

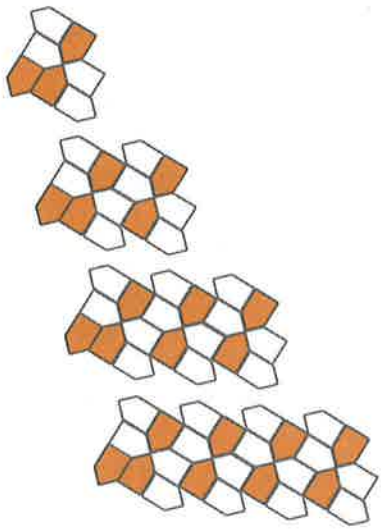
What is the chance that the black face is perpendicular to the table?

(A) one in six
(B) two in six
(C) three in six
(D) four in six

26. How many multiples of 21 are there between 200 and 400?

(A) 9
(B) 10
(C) 11
(D) 12

27. Each shape in this pattern uses orange and white tiles.



Which rule gives the number of white tiles in relation to the number of orange tiles?

(A) 2 × (orange tiles – 1)
(B) orange tiles – 1 × 2
(C) 2 × orange tiles – 1
(D) (orange tiles × 2) – 1

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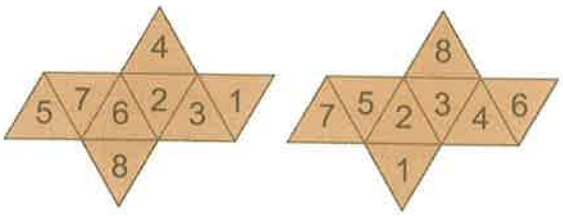
28. Two faces of a die that do not share an edge or a vertex are said to be opposite faces.

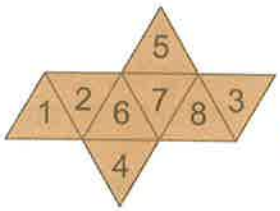
The opposite faces of an eight-sided die add to 9.

Which is a correct net for such a die?

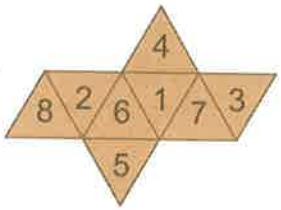


(A)

(B)



(C)



(D)

29. A group of volunteers planted a total of 30 trees in a local park. Three different types of trees were planted: eucalypt, wattle and pine trees.

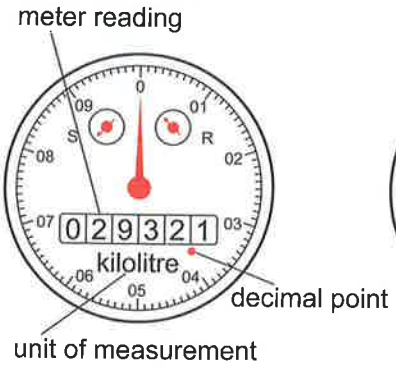
Of the trees planted, 60% were eucalypt trees and 10% were wattle trees.

How many pine trees were planted?

(A) 9
(B) 10
(C) 21
(D) 30

30. Tony suspects that he has a leaking water pipe in his house.

The diagrams show his water meter readings on two days.



Monday 15 June 8 am

Wednesday 17 June 8 am

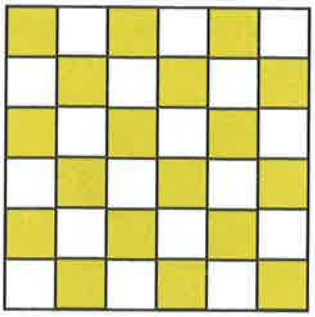
He estimates that in these two days he should only have used a total of 850 litres.

He also estimates that the leak has wasted a total of 1000 litres up until the morning of Wednesday 17 June.

When did the leak start?

(A) Sunday 14 June
(B) Saturday 13 June
(C) Wednesday 10 June
(D) Tuesday 9 June

31. A board has squares on it as shown.



How many squares, of any size, can be traced on this board?

(A) 37 (B) 41
(C) 91 (D) 182

32. Yara created a picture on her computer.

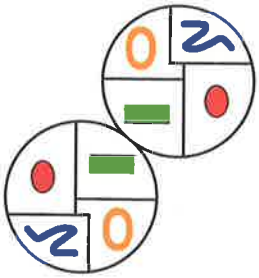
To create a design, she made a copy of the picture and rotated the copy 90° anticlockwise about the point *P*.

Which of the following was her design?

(A)

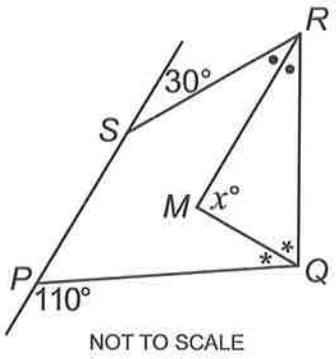
(B)

(C)



(D)

33. The diagram shows quadrilateral *PQRS* in which *RM* bisects $\angle R$ and *QM* bisects $\angle Q$.



What is the value of x?

(A) 40
(B) 70
(C) 110
(D) 250

34. What is another way of writing the expression $x \div 2 \div 3$?

(A) $\frac{3x}{2}$
(B) $\frac{2x}{3}$
(C) $\frac{x}{5}$
(D) $\frac{x}{6}$

35. $4! = 4 \times 3 \times 2 \times 1$

$5! = 5 \times 4 \times 3 \times 2 \times 1$

Jess wrote the expression $20! - 19!$ on the board.

Which of the following has the same value as this expression?

(A) 1!
(B) 20
(C) $19 \times 19!$
(D) $20 \times 19!$

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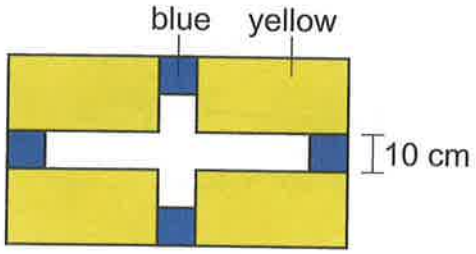
QUESTIONS 36 TO 40 ARE FREE RESPONSE.
Write your answer in the boxes provided on the ANSWER SHEET and fill in the ovals that match your answer.

36. Natalia designed a flag made of rectangles and squares.



NOT TO SCALE

The four yellow rectangles have the same area. The length of each yellow rectangle is twice its width.

The four blue squares all have the same area.

The length of the side of a blue square is half the width of a yellow rectangle.

What is the area of the white part, in cm^2?

37. A bottle contains a liquid. Natalia uses 20% of the liquid in one experiment and 50% of the remaining liquid in another experiment.

She then divides what was left of the liquid equally between two beakers. The amount of liquid in each beaker is 120 mL.

How much liquid was originally in the bottle, in mL?

38. In a magic square the rows, columns and diagonals each add up to the same number. In this magic square the numbers 39, 47, 55, 63, 67 and 71 are missing.

43		59
		?
51		

What number does ? stand for?

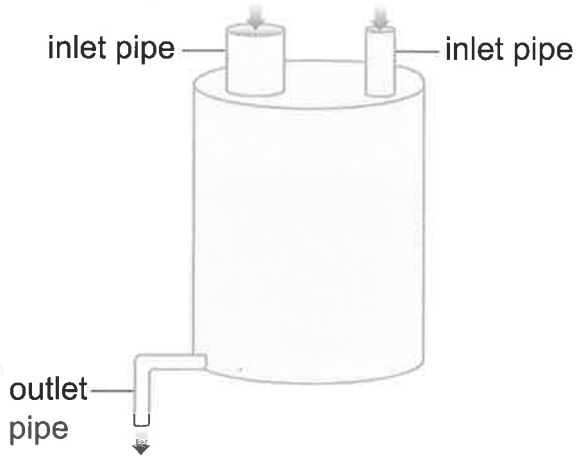
39. The table shows the marks Anish and Yara scored in four tests.

	Test 1	Test 2	Test 3	Test 4
Anish	40	89	23	48
Yara	90	18	67	75

After Anish and Yara completed their fifth test, the mean of Anish's marks was five more than the mean of Yara's marks.

How many more marks than Yara did Anish score in the fifth test?

40. A large water tank has two inlet pipes of different sizes, and one outlet pipe.



With the outlet pipe closed, it takes 3 hours to fill the empty tank using the large inlet pipe only. It takes 4 hours to fill the empty tank using the small inlet pipe only.

When the tank is full, and the inlet pipes are closed, it takes the outlet pipe 8 hours to empty the tank.

Assuming the tank is empty and all three pipes are opened, how long will it take to fill the tank, to the nearest minute?

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