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THE UNIVERSITY OF NEW SOUTH WALES
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**PAPER
F**



**2010
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:

82

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.

A **CALCULATOR** is required.

1. This is a photo of an apple.



Which of these is most likely to be the mass of the apple?

- (A) 1 g
- (B) 10 g
- (C) 100 g
- (D) 1000 g

2. What number can replace the **?** in this number sentence?

$$\frac{3}{5} \times \frac{?}{6} = \frac{2}{3} \times \frac{3}{5}$$

- (A) 2
- (B) 3
- (C) 4
- (D) 5

3. Adam is training for a swimming carnival. The table shows his times for swimming 50 m.

Mon	58 seconds
Tues	1 minute 2 seconds
Wed	1 minute 4 seconds
Thu	58 seconds
Fri	56 seconds

What is the difference between Adam's fastest and slowest times, in seconds?

- (A) 2
- (B) 8
- (C) 48
- (D) 52

4. At a gym five different sports are available.

The graph shows the proportion of students playing each sport during a physical education lesson.



Each student can only play one sport.

There are 36 students playing football.

What is the total number of students who are playing sport?

- (A) 90
- (B) 144
- (C) 180
- (D) 270

5. It is given that:

- x is a positive integer
- x is even
- $x < 8$.

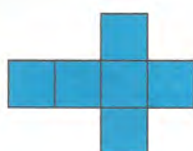
Using the information provided above, which is a possible value for x ?

- (A) 6
(B) 7
(C) 8
(D) 9

6. Which of the following is **not** the net of a cube?



(A)



(B)

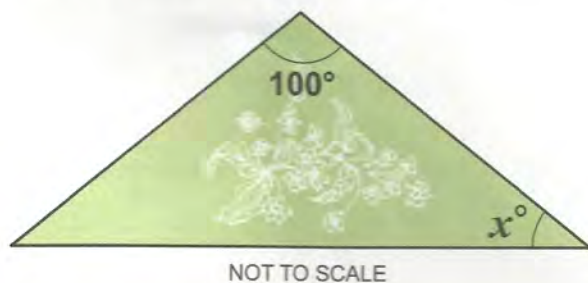


(C)



(D)

7. The sign for a garden centre is in the shape of an isosceles triangle.



What is the value of x ?

- (A) 10
(B) 20
(C) 40
(D) 60

8. There are 10 identical balls. The letters of the word 'DIDGERIDOO' are written, one on each ball.

The balls are placed in a bag and then one ball is chosen without looking.

What is the chance of choosing a ball that has the letter 'O' written on it?

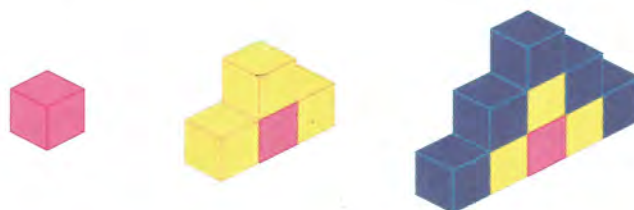
- (A) 0.1
(B) 0.2
(C) 0.5
(D) 0.8

9. What is the next number in this number pattern?

3, 3, 6, 9, 15, 24, ...

- (A) 27
(B) 33
(C) 36
(D) 39

10. Here are the first three objects in a pattern.



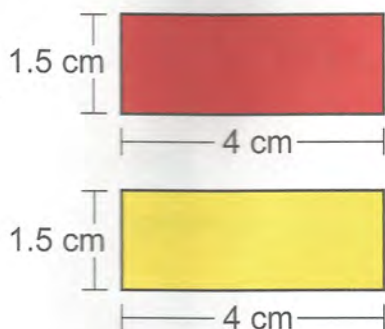
How many blocks would be needed to make the 5th object in the pattern?

- (A) 15
(B) 16
(C) 25
(D) 26

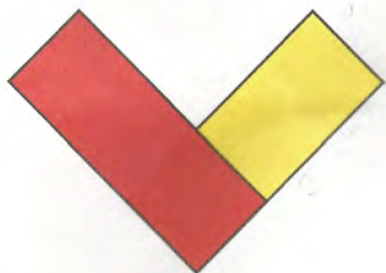
11. Which property do squares share with all other rectangles?

- (A) all angles equal
- (B) four lines of symmetry
- (C) all sides of equal length
- (D) perpendicular diagonals

12. Manling cut out two rectangles.



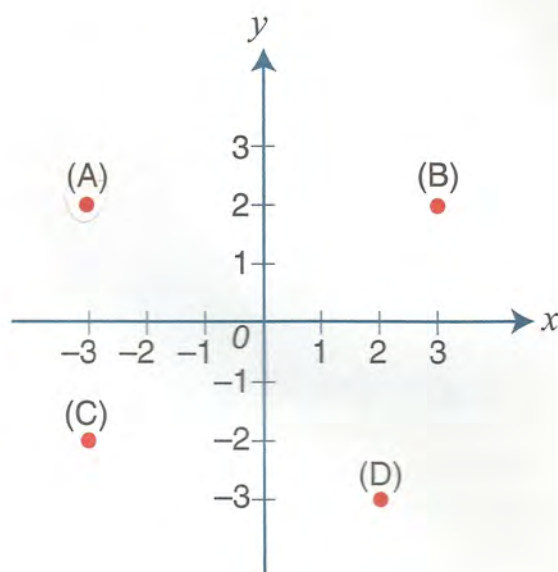
She glued one rectangle on top of the other to make an L-shape.



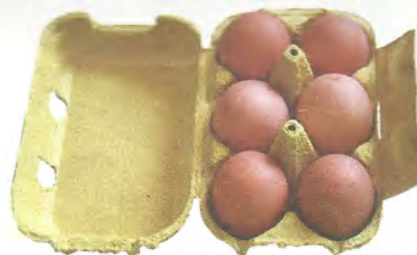
What is the area of the overlapping section, in cm^2 ?

- (A) 2.25
- (B) 6
- (C) 9.75
- (D) 12

13. Which of these four points has the coordinates $(2, -3)$?



14. Noor bought four of these cartons of eggs to make a pudding.

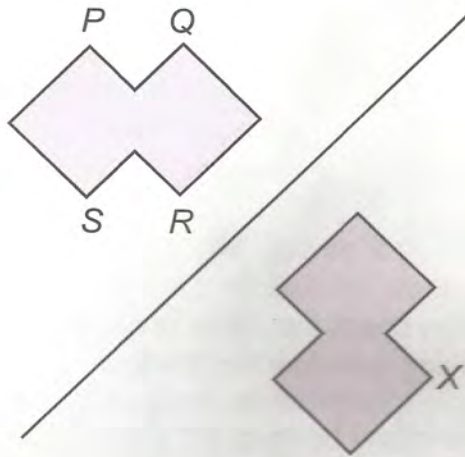


She used 16 eggs.

How many cartons of eggs were left?

- (A) $\frac{1}{2}$
- (B) $1\frac{1}{6}$
- (C) $1\frac{1}{3}$
- (D) $2\frac{2}{3}$

15. The figure with a corner labelled X is reflected in the line shown.



Which point is the reflection of point X ?

- (A) P
- (B) Q
- (C) R
- (D) S

16. All of these numbers can be divided by the same 'magic' number without leaving a remainder.

182 273 286 429

What is the 'magic' number?

- (A) 3
- (B) 7
- (C) 11
- (D) 13

17. The picture shows a model of a walrus from above.



Luisa is standing south-east of the model.

Which view of the model does she see?



(A)



(B)

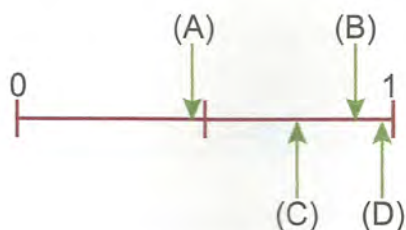


(C)



(D)

18. Which arrow is closest to 0.9 on this number line?



19. Adam has a fair twelve-sided die. The faces of the die display the numbers from 1 to 12.



Adam rolls the die 20 times and records his results.

2	7	5	8	10
4	2	11	7	9
7	2	9	1	1
3	8	10	12	2

Which option shows the mean and median of Adam's results?

	Mean	Median
(A)	6	2
(B)	6	7
(C)	10	2
(D)	10	7

20. Ethan spent two hours making badges. A small badge took 5 minutes to make and a large badge took 10 minutes to make.



Ethan spent the same amount of time making both kinds of badge.

How many badges did Ethan make?

- (A) 12 (B) 15
(C) 18 (D) 24

21. In some countries, length is measured in inches, feet and yards.

12 inches = 1 foot

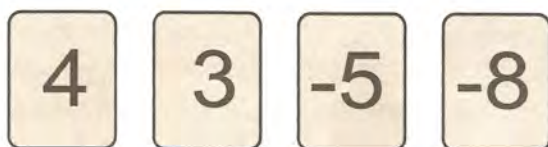
3 feet = 1 yard

1 inch = 25.4 mm

How many metres are there in one yard?

- (A) 0.9144
(B) 9.144
(C) 91.44
(D) 914.4

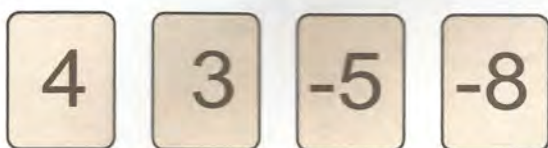
22. Sunil has four number cards.



The sum of the four cards is -6 .

Sunil removes one card so that the sum of the remaining cards is as small as possible.

Which card does he remove?



(A) (B) (C) (D)

23. A circle is cut into twenty equal sectors.

What angle would three adjoining sectors make at the centre?

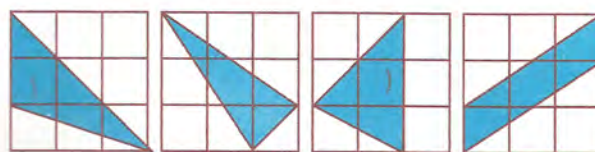
- (A) 18°
(B) 54°
(C) 60°
(D) 120°

24. Luisa needs 12 cm by 6 cm cards.

What is the maximum number of cards of this size she can cut from a sheet of cardboard measuring 42 cm by 42 cm?

- (A) 21
(B) 24
(C) 24.5
(D) 25

25. Which of the following shaded regions has a different area from the other shaded regions?



(A) (B) (C) (D)

26. Rajah is writing all the numbers from 1 to 100 in a pattern. This grid shows the start of his pattern.

	A	B	C	D	E	F	G	H	I	J
1	1	2	9	10						
2	4	3	8	11						
3	5	6	7	12						
4	16	15	14	13						
5	17									
6										
7										
8										
9										
10										

In square D4 he has written 13. In square E3 he should write 23.

What should Rajah write in square D6?

- (A) 15
(B) 25
(C) 29
(D) 33

27. Sunil has 1 litre of mango juice that contains 14% sugar. He also has 3 litres of orange juice that contains 10% sugar.

Sunil mixes the mango juice and the orange juice together.

What is the percentage of sugar in the juice mixture?

- (A) 11
- (B) 12
- (C) 24
- (D) 44

28. The diagram shows the hexagonal numbers 1, 6, 15 and 28.



If x is the n th hexagonal number, then

$$n = \frac{\sqrt{8x+1}+1}{4}$$

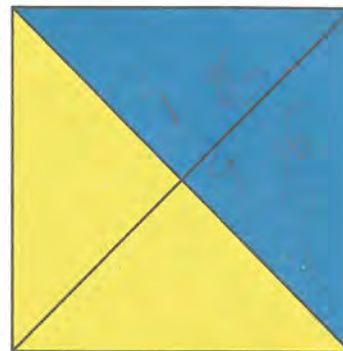
Which of the following is **not** a hexagonal number?

- (A) 91
- (B) 120
- (C) 154
- (D) 190

29. A square is divided into four quarters by drawing the diagonals.

Each quarter is coloured using yellow or blue paint. Adjacent quarters can be the same colour. All quarters must be coloured.

One colour scheme is shown below.



Two painted squares are considered to have the same colour scheme if one may be obtained from the other by rotation.

In total, how many different colour schemes are possible?

- (A) 5
- (B) 6
- (C) 8
- (D) 16

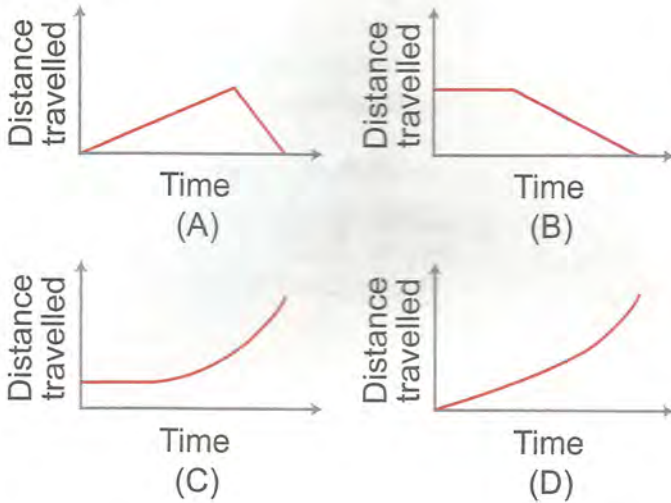
30. Kate has m counters. John has n counters. John has p counters more than Kate.

Which equation shows this?

- (A) $m = p - n$
- (B) $n = p - m$
- (C) $m = n + p$
- (D) $n = m + p$

31. Adam rode a bicycle up a hill at a constant speed. After reaching the top of the hill, he took his feet off the pedals and allowed the bicycle to speed up as it went down the hill.

Which of the following graphs shows his journey?



32. On the small island nation of Palmerton, car number plates are made up of four digits separated by a P in the centre, as shown.



What is the total number of different plates available in Palmerton?

- (A) 99
- (B) 100
- (C) 1000
- (D) 10000

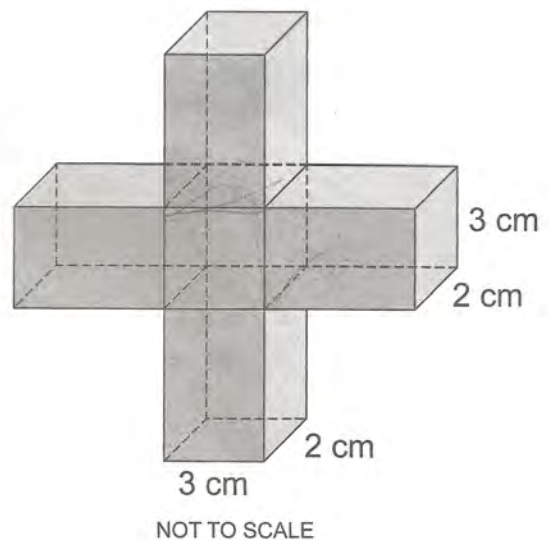
33. An emirp is a special type of prime number. When the digits of the number are reversed, a different prime number is made.

An example of an emirp is 13. When the digits of 13 are reversed the result is 31, which is also a prime number.

Which of the following is **not** an emirp?

- (A) 37
- (B) 79
- (C) 193
- (D) 311

34. A teacher shows her class a 3D shape made by intersecting two identical rectangular prisms, each with dimensions $2\text{ cm} \times 3\text{ cm} \times 10\text{ cm}$, as shown in the diagram.



The prisms have a common centre and the faces intersect at right angles.

What is the volume of the resulting solid, in cubic centimetres?

- (A) 100
- (B) 102
- (C) 108
- (D) 120

35. Nancy is investigating the number subtraction pattern shown.

0	7	7	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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The last line of the pattern is incomplete.

What number should go in the place marked **N**?

- (A) 35
(B) 28
(C) -63
(D) -98

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. What is the size of an angle whose complement is 25% of its supplement?

37. How many different answers can be obtained from the following calculation using one or more pairs of brackets?

$$4 + 8 \div 4 \times 2$$

38. Sunil makes a pattern of square grids using toothpicks.

Grid	Number of toothpicks on each side	Total number of toothpicks
	1	4
	2	12
	3	24

He makes a grid using a total of 144 toothpicks.

How many toothpicks are there on each side of that grid?

39. There are 450 students at Winterdale High School. Each student was asked to vote on whether they preferred playing basketball, hockey or tennis. Each student voted once only.

When the votes were counted, it was found that 48% of students did not vote for basketball and 70% did not vote for hockey.

How many students voted for tennis?

40. A light box has three lights which are coloured red, green and blue. The box starts with all of the lights off.

The red light flashes once every three seconds. The green light flashes once every five seconds and the blue light flashes once every seven seconds.

How many times in 500 seconds do exactly two lights flash at the same time?



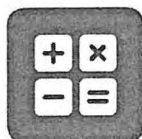
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2010 Mathematics Answer Keys

ICAS
International Competitions
and Assessments for Schools

Question Number	Paper A	Paper B	Paper C	Paper D	Paper E	Paper F	Papers G & H	Papers I & J
1	B	B	B	A	A	C	A	A
2	A	B	D	B	C	C	A	C
3	A	C	A	D	D	B	C	C
4	D	D	B	D	B	B	D	B
5	C	C	D	A	D	A	A	A
6	B	B	B	B	A	C	D	C
7	C	A	B	D	C	C	B	B
8	B	D	C	C	D	B	A	D
9	A	A	A	C	D	D	D	B
10	C	D	D	C	A	C	A	D
11	C	D	C	A	D	A	D	B
12	D	B	B	A	B	A	B	C
13	B	C	B	D	A	D	C	D
14	A	B	C	B	C	C	C	C
15	D	B	B	B	C	A	B	B
16	B	A	C	B	D	D	B	B
17	B	A	A	D	B	D	C	A
18	A	A	B	D	D	B	B	D
19	D	D	D	B	B	B	C	B
20	D	B	B	C	B	C	A	C
21	B	A	C	A	B	A	B	C
22	C	C	D	C	C	A	D	A
23	C	B	A	B	C	B	B	C
24	C	D	D	D	B	B	C	A
25	A	D	D	C	B	B	A	D
26	A	B	A	D	C	D	B	B
27	C	C	C	C	A	A	B	C
28	A	D	C	C	A	C	A	D
29	C	C	B	B	B	B	C	A
30	A	C	C	C	B	D	D	D

(Please turn over)



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2010 Mathematics Answer Keys

ICAS
International Competitions
and Assessments for Schools

Question Number	Paper A	Paper B	Paper C	Paper D	Paper E	Paper F	Papers G & H	Papers I & J
31	B	D	A	B	D	D	D	C
32	B	D	B	B	D	D	D	B
33	C	B	C	D	C	C	C	C
34	D	B	B	C	A	B	D	C
35	C	D	B	A	A	D	B	D
36	B	B	B	576	576	60 060	12 012	12 012
37	C	C	C	394	60 060	5 05 005 0 5	6 06 006 0 6	240
38	B	A	D	120	120	8 08 008 0 8	3 03 003 0 3	25 025
39	A	C	C	36 036	14 014	81 081	3 03 003 0 3	4 04 004 0 4
40	D	A	A	648	45 045	58 058	173	19 019

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