UNSW THE UNIVERSITY OF NEW SOUTH WALES SYDNEY • AUSTRALIA

EDUCATIONAL ASSESSMENT AUSTRALIA

PAPER F

ICAS

INTERNATIONAL COMPETITIONS AND ASSESSMENTS FOR SCHOOLS

MATHEMATICS 2009

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.
A **CALCULATOR** is required.

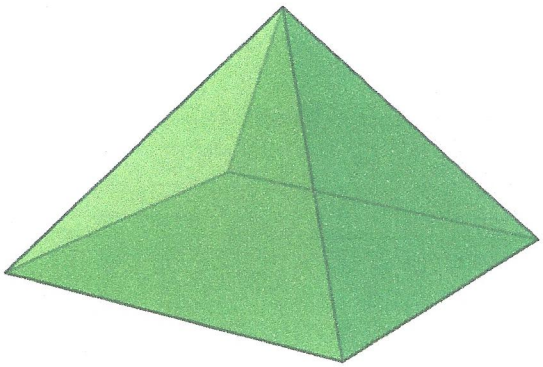
PLEASE SEE BACK COVER FOR A LIST OF THE YEAR LEVELS THAT SHOULD SIT THIS PAPER

1. A bag contains one red, one yellow, two blue and three green balls. Shireen takes one ball out of the bag without looking.

What is the most likely colour of the ball?

(A) red
(B) blue
(C) green
(D) yellow

2. This is a square pyramid.



Which option describes the features of a square pyramid?

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

3. There are 18 sacks of fertiliser on a truck. Each sack has a mass of 25 kg.

What is the mass of all the fertiliser on the truck in **tonnes**?

(A) 450
(B) 45
(C) 4.5
(D) 0.45

4. How many positive factors of 36 are multiples of 4?

(A) 1
(B) 2
(C) 3
(D) 4

5. Lucy poured 300 mL from a partly used 1 L milk carton. The carton was then a quarter full.

How much milk did the carton contain before Lucy poured out 300 mL?

(A) 75 mL
(B) 250 mL
(C) 375 mL
(D) 550 mL

6. Gina bought three packets of biscuits. Two of the packets were the same size and one was smaller. The smaller packet had 9 fewer biscuits than the larger packet. In total she had 72 biscuits.

How many biscuits were there in one **large** packet?

(A) 27
(B) 24
(C) 21
(D) 15

7. Dave set the timer on a microwave oven to cook for 1 hour, 20 minutes and 15 seconds.

How many seconds was the oven set for?

(A) 4815
(B) 2160
(C) 1275
(D) 95

8. Which of these fractions has the greatest value?

(A) $\frac{6666}{7777}$ (B) $\frac{555}{666}$

(C) $\frac{88}{99}$ (D) $\frac{7}{8}$

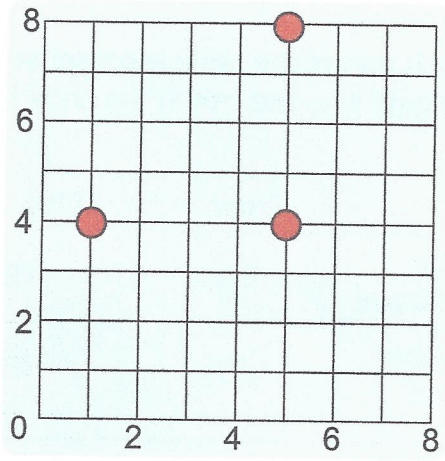
9. Eloise wrote this number pattern.

2, 8, 26, 80, 242, ...

Which rule describes her number pattern?

(A) add 6 to the previous term
(B) multiply the previous term by 3 and add 2
(C) multiply the previous term by 4
(D) multiply the previous term by 3 and add 4

10. The diagram shows the points (1, 4), (5, 4) and (5, 8) on a grid.



Manling drew another point on the grid which was an equal distance from each of the other three points.

What are the coordinates of the fourth point?

(A) (8, 1)
(B) (6, 3)
(C) (3, 6)
(D) (1, 8)

11. A 'perfect number' is a number that is equal to the sum of all its factors except for itself. Six is a perfect number because

1 + 2 + 3 = 6

Which of these is a perfect number?

(A) 20
(B) 24
(C) 26
(D) 28

12. At Hillside School, the choir consists of all the Year 8 students together with all of the students in the school band.

Which part of the table represents the students who are **not** in the choir?

	Year 8	Other Years
Not in school band	(A)	(B)
In school band	(C)	(D)

13. An automatic teller machine (ATM) has only \$20 and \$50 notes.

When possible, \$50 notes are given out instead of \$20 notes. For example, \$100 is given out as two \$50 notes instead of five \$20 notes.

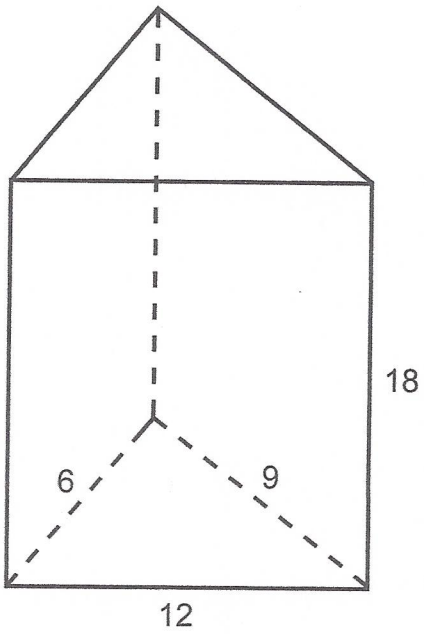
Six people use the automatic teller machine.

Person	Amount withdrawn (\$)
Rene	50
Steve	60
Tom	70
Uma	80
Vance	90
Will	110

Who received exactly **one** \$50 note?

(A) Rene, Steve, Tom, Uma, Vance and Will
(B) Rene, Steve, Tom, Uma and Vance only
(C) Rene, Tom, Vance and Will only
(D) Rene, Tom and Vance only

14. Similar solids have their corresponding sides in proportion.



Which would be the set of dimensions for another triangular prism similar to the one shown?

(A) 1 unit, 2 units, 3 units, 6 units
(B) 2 units, 3 units, 4 units, 6 units
(C) 2 units, 3 units, 4 units, 9 units
(D) 2 units, 3 units, 6 units, 9 units

15. 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

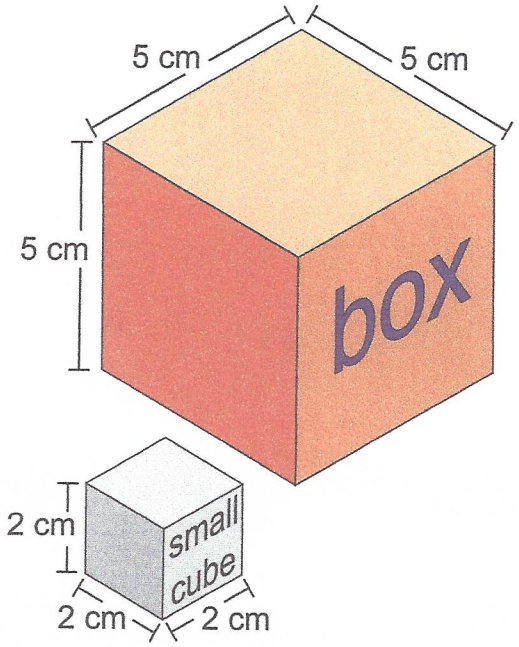
16. $7 - x = z$

$2 - y = w$

What is the value of $z - w$ if $x = -4$ and $y = -3$?

(A) 6
(B) 7
(C) 8
(D) 12

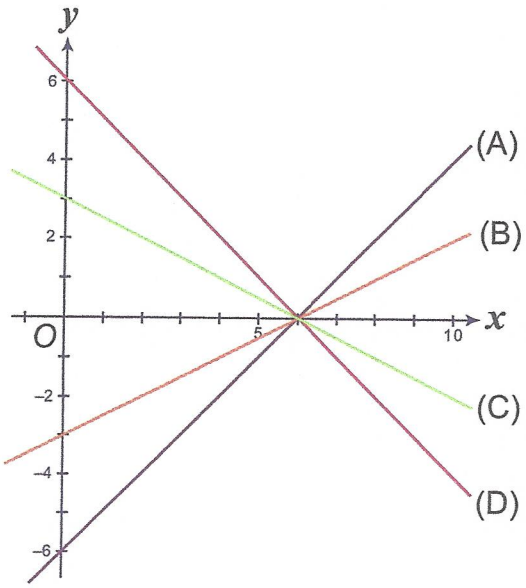
17. Khalid has a box and a number of small solid cubes.



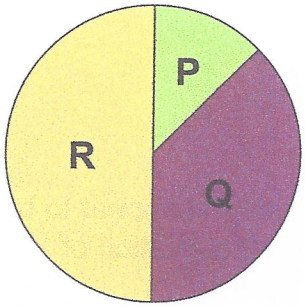
What is the largest number of small cubes he can fit wholly within his box?

(A) 16
(B) 15
(C) 8
(D) 6

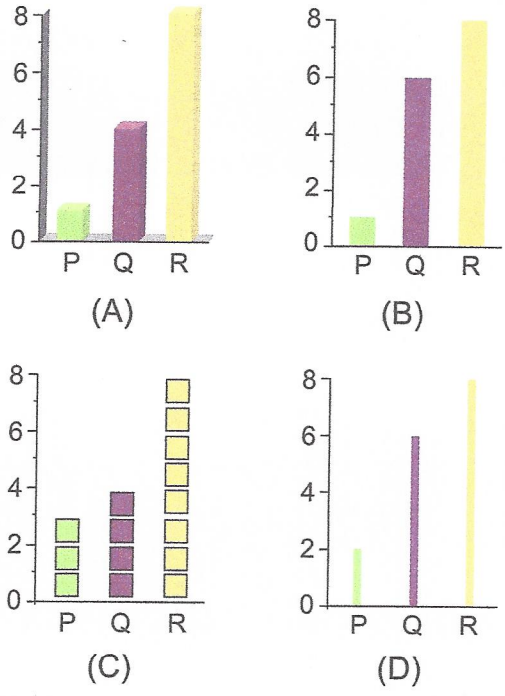
18. Which line represents $2y = x - 6$?



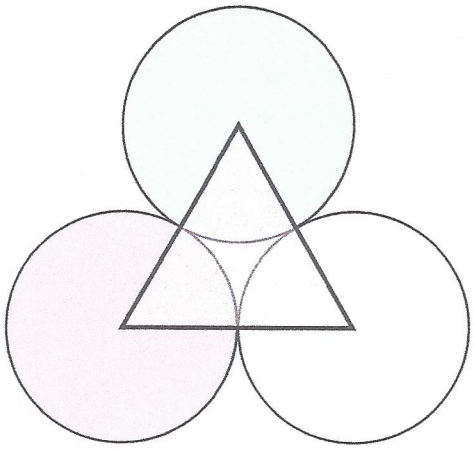
19. Sally drew this graph.



Which of these graphs shows the same data as Sally's graph?



20. This diagram shows three circles, each with a radius of 6 cm.

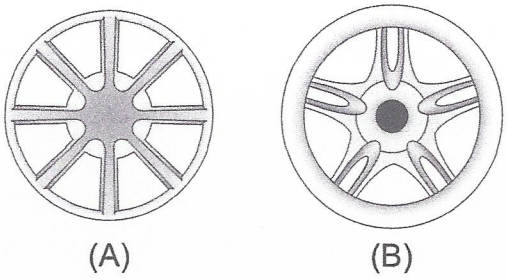


Each vertex of the triangle is at the centre of a circle.

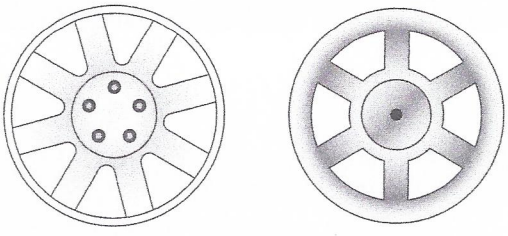
What is the perimeter of the triangle?

(A) 12 cm
(B) 18 cm
(C) 36 cm
(D) 72 cm

21. Which wheel will appear to be in the same position after a rotation of 270°?

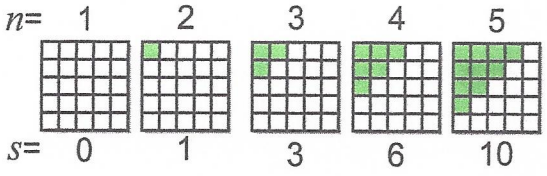


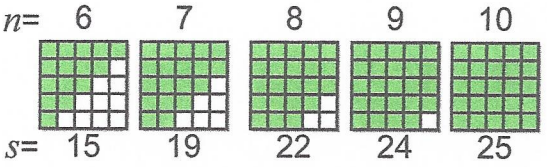
(A) (B)



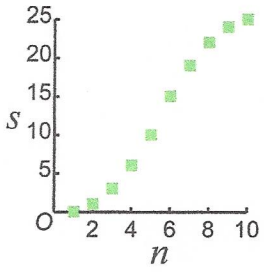
(C) (D)

22. The diagram shows a pattern of shaded squares.

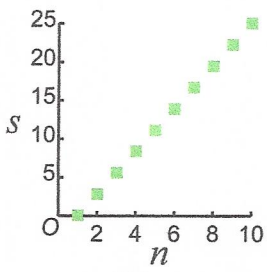




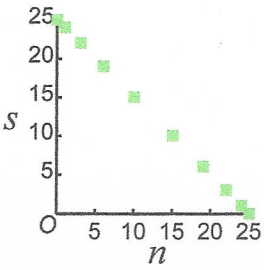
Which graph matches the data in the pattern?



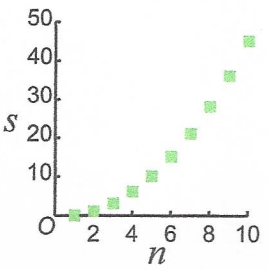
(A)



(B)



(C)



(D)

23. Jake read that most people walk about 118 000 miles in their lifetime.

One kilometre is approximately equal to 62% of a mile.

About how many kilometres will most people walk in their lifetime?

(A) 73 000
(B) 118 000
(C) 120 000
(D) 190 000

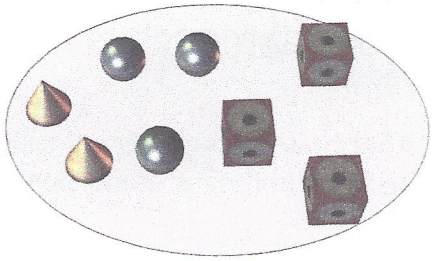
24. A train travelled at a speed of 165 km/h.

Approximately how far did the train travel in one **second**?

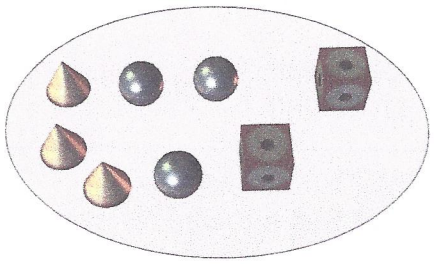
(A) 3 metres
(B) 50 metres
(C) 600 metres
(D) 1400 metres

25. The picture shows the masses of three sets of objects.

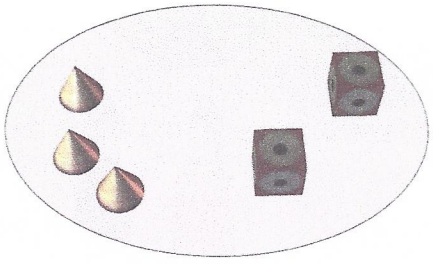
42 kg =



38 kg =



23 kg =



What is the mass of one of these  in kilograms?

(A) 3
(B) 5
(C) 7
(D) 15

26. Alice had 40 strawberries to share.

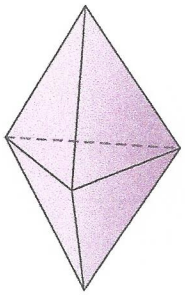
She gave each of her friends the same number of strawberries and had 5 left over for herself. Alice had fewer strawberries than each of her friends.

How many friends did Alice share strawberries with?

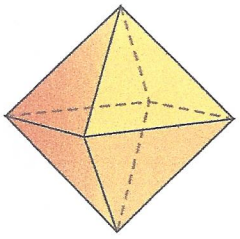
(A) 8 (B) 7

(C) 6 (D) 5

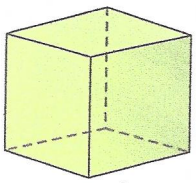
27. Which of these solids does **NOT** have the same number of faces meeting at every vertex?



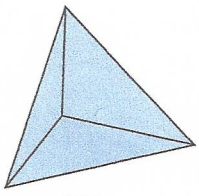
(A)



(B)

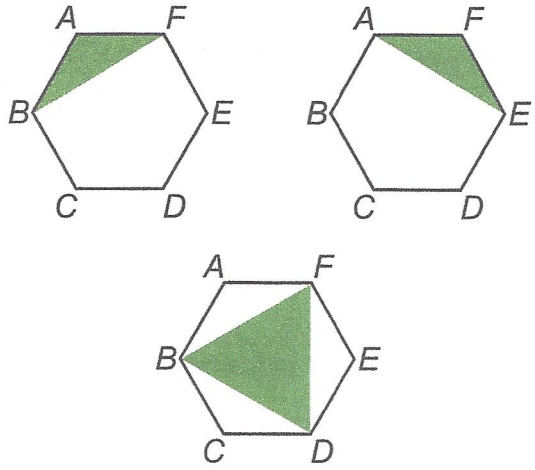


(C)



(D)

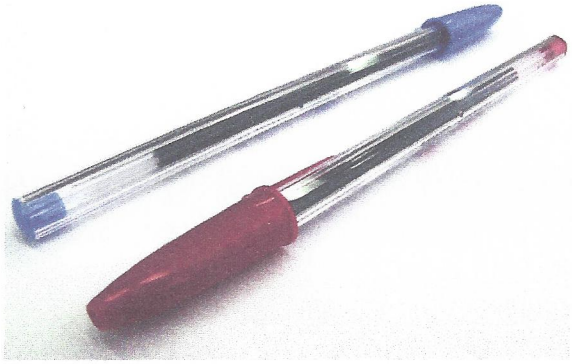
28. The diagram shows three different triangles *ABF*, *AEF*, *BDF* that can be drawn by joining the corners of a hexagon.



How many different triangles can be drawn in this hexagon?

(A) 26
(B) 24
(C) 20
(D) 18

29. A school bought red and blue pens in separate boxes.

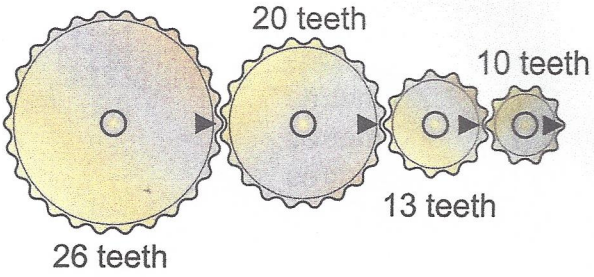


All the boxes of red pens held the same number of pens. Each box of blue pens held 70. The school bought 300 pens in total.

Which of these could **not** be the number of red pens in a box?

(A) 32
(B) 36
(C) 45
(D) 46

30. The diagram shows the starting position of four gears and the number of teeth on each.



When one gear moves by one tooth, the gear next to it moves by one tooth. The smallest gear moves by one tooth every second.

After how many seconds will all the arrows be back in their starting position?

(A) 36
(B) 69
(C) 130
(D) 260

31. Kent has a recipe for salad dressing that uses 12 spoons of oil and 3 spoons of vinegar.

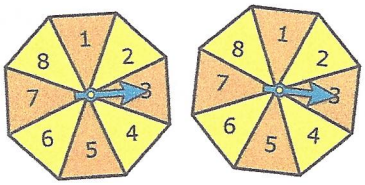
Kent decides to use $\frac{2}{3}$ of the amount of oil, but the same amount of vinegar.

What fraction of Kent's dressing will be vinegar?

(A) $\frac{3}{11}$ (B) $\frac{1}{3}$

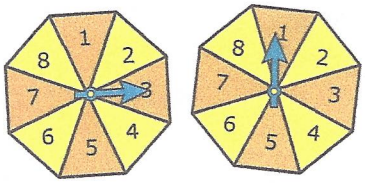
(C) $\frac{3}{8}$ (D) $\frac{8}{11}$

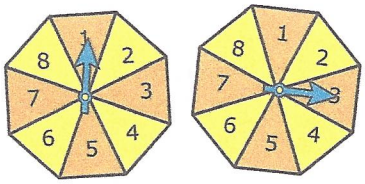
32. Geetha has two spinners. She spins the arrow on each one and records the number that each arrow points to. Then, she adds the two numbers to find their total.

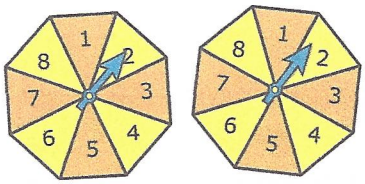


total = 6

There are three ways she can get a total of 4.



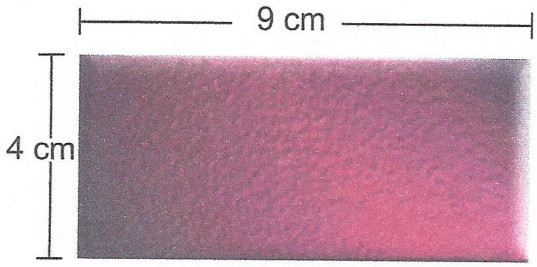




Which two totals can she get in exactly **six** different ways?

(A) 7 and 11
(B) 7 and 10
(C) 6 and 11
(D) 6 and 10

33. Simon has some rectangular tiles the same size as this.



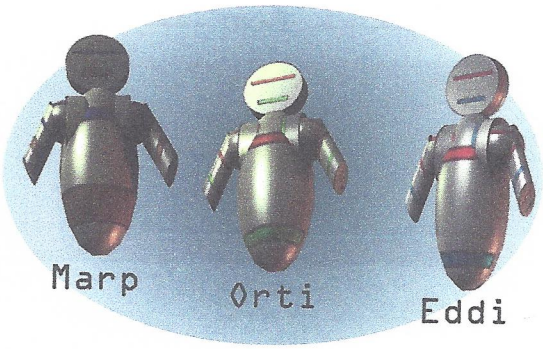
NOT TO SCALE

He uses the tiles to cover a square section of floor. He can do this without cutting, overlapping or leaving any gaps between the tiles.

What is the smallest possible area of the square section?

(A) 36 cm^2
(B) 81 cm^2
(C) 169 cm^2
(D) 1296 cm^2

34. A space station has three robots that make repairs.



The Marp robot can make 12 repairs in 10 minutes. The Orti robot can make 10 repairs in 8 minutes. The Eddi robot can make 8 repairs in 6 minutes.

The space station needs 100 repairs.

Approximately how long will it take the three robots working together to complete 100 repairs?

(A) 27 minutes
(B) 34 minutes
(C) 41 minutes
(D) 83 minutes

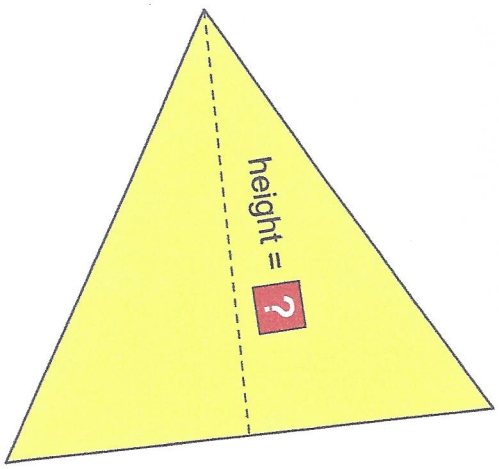
35. What is the missing number in this pattern?

1	1	2	3	5	8	13
1	2	5	10	20	38	71
2	5	14	32	71	149	304
3	10	32	84	207	478	1060
5	20	71	207	556	1390	3310
8	38	149	478	1390	3736	9496
13	71	304	1060	3310	9496	?

(A) 12806
(B) 18992
(C) 22728
(D) 25612

QUESTIONS 36 TO 40 ARE FREE RESPONSE.

36. The area of this equilateral triangle is 7775 square units. The perimeter of the triangle is 402 units.



What is the height of the triangle to the nearest unit?

(Write only the number on your answer sheet.)

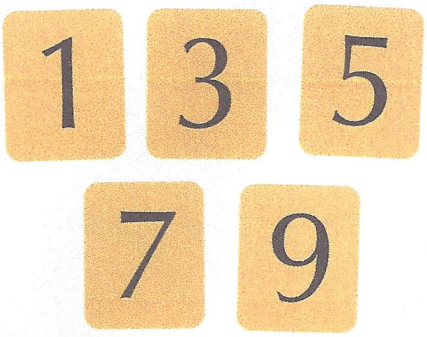
37. In this equation n and m are whole numbers and $100 < m < 1000$.

$$n^n = m$$

What is the value of m?

(Write only the number on your answer sheet.)

38. Sophia has one of each of these cards.



How many three digit numbers divisible by three can she make with her cards?

(Write only the number on your answer sheet.)

39. The difference between two numbers, a and b, is 24.

When 4 is added to both a and b, the larger of these new numbers is 5 times the smaller of these new numbers.

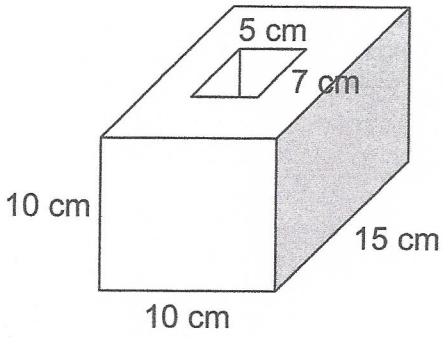
What is the value of the smaller of the two numbers, a and b?

(Write only the number on your answer sheet.)

40. A foam block has a length of 15 cm, width of 10 cm and height of 10 cm.

A rectangular hole is cut out of the block. It has a length of 7 cm, width of 5 cm and extends to the bottom of the foam block.

Kim paints all the faces of the remaining foam.



What is the total surface area of the faces she paints, in cm^2?

(Write only the number on your answer sheet.)

ACKNOWLEDGEMENT

The Educational Testing Centre would like to thank the copyright holders who have granted permission to use the texts and graphics cited below. We would appreciate information regarding any errors or omissions in the sources.

SOURCES

Page 5 Fergus the Ferret image reproduced by permission of Rollercoaster and ABC Online © 2003 Australian Broadcasting Corporation. All rights reserved.