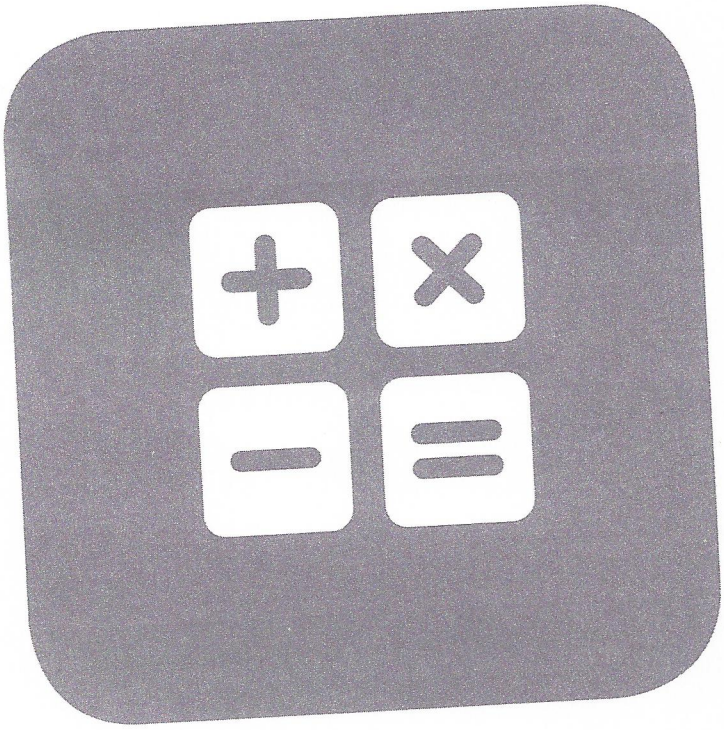
UNSW Global
THE UNIVERSITY OF NEW SOUTH WALES
SYDNEY • AUSTRALIA

PAPER F



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.

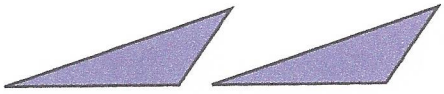
There are **35 MULTIPLE-CHOICE QUESTIONS** (1–35).
Use the information provided to choose the **BEST** answer from the four possible options.
On your **ANSWER SHEET** fill in the oval that matches your answer.

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.
A **CALCULATOR** is required.

1. The figure below shows a parallelogram.

Which option shows all the shapes used to make this parallelogram?

(A) 

(B) 

(C) 

(D) 

2. Natalia has 27 cards.

This is three more than four times the number of cards her brother has.

If Natalia's brother has x cards, which equation best represents this information?

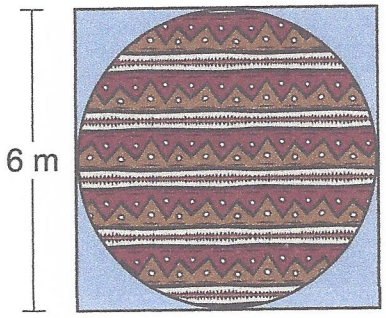
(A) $27 = 7 + x$
(B) $27 = 12 + x$
(C) $27 = 3x + 4$
(D) $27 = 4x + 3$

3. The formula to find the circumference (C) of a circle is

$$C = \pi \times d$$

where d = the diameter of the circle.

A circular mat is placed on a square carpet, as shown.



What is the circumference (C) of the circular mat, to the nearest metre?

(Use $\pi = 3.14$ in your calculation.)

(A) 38
(B) 28
(C) 24
(D) 19

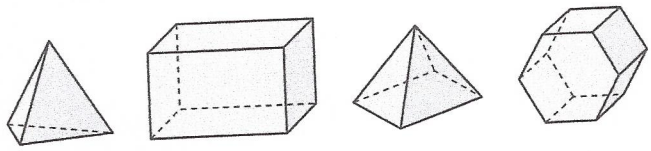
4. The ratio of cars to motorbikes in a car park is 10 cars to 4 motorbikes.

There are 70 motorbikes in the car park.

How many cars are there?

(A) 25
(B) 28
(C) 50
(D) 175

5. Tony made models of four solids.



1 2 3 4

He chose two of the models so that one solid had two more faces than the other solid.

Which option shows two models that Tony could have chosen?

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

6. Jess is organising a pizza party. She plans to serve four slices of pizza to each adult and three slices to each child.

Each pizza is cut into eight equal slices.

What is the smallest number of pizzas Jess would need to buy for 20 adults and 16 children?

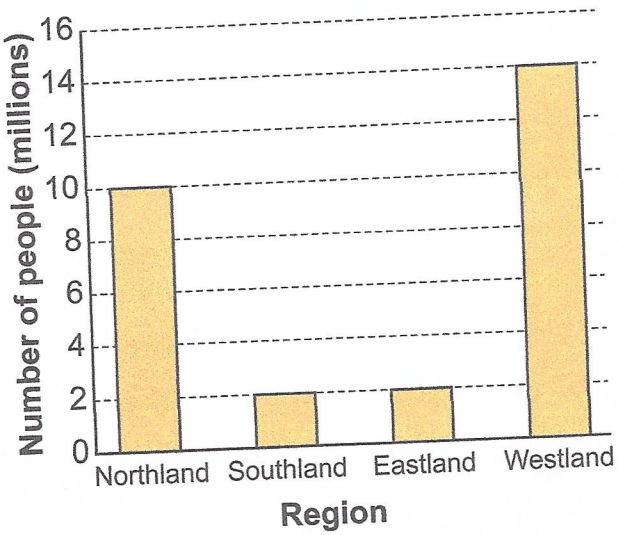
(A) 16
(B) 18
(C) 19
(D) 20

7. 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.

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

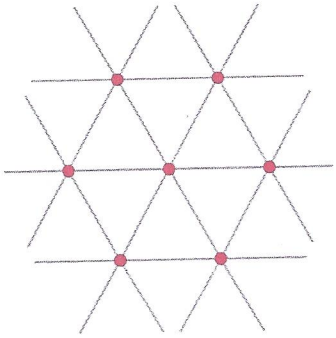


She wants to put the same information in a sector (pie) graph.

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

(A) 64°
(B) 90°
(C) 150°
(D) 180°

9. Seven dots are shown on a grid.



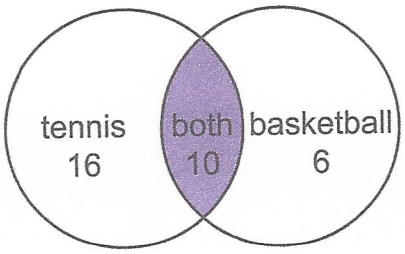
Anish wants to draw a plane shape using the dots for the vertices and the grid lines for the sides. Not all dots and grid lines will be used.

Which shape will Anish **NOT** be able to draw?

(A) rectangle
(B) trapezium
(C) parallelogram
(D) equilateral triangle

10. During a summer camp, students play tennis or basketball or both tennis and basketball.

This diagram shows the numbers of students playing these sports.



One student is chosen at random.

What is the probability that the chosen student plays both tennis and basketball?

(A) $\frac{22}{32}$ (B) $\frac{10}{32}$

(C) $\frac{1}{10}$ (D) $\frac{1}{22}$

11. Four students distributed posters around their school.

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

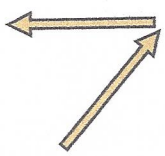
Student	Fraction of posters distributed
Anish	$\frac{3}{10}$
Jess	$\frac{1}{4}$
Natalia	$\frac{1}{20}$
Tony	$\frac{2}{5}$

Which student distributed the greatest number of posters?

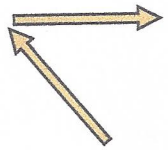
(A) Anish
(B) Jess
(C) Natalia
(D) Tony

12. Lien walked northeast for one kilometre and then west for one kilometre.

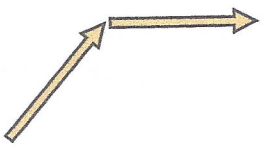
Which of these diagrams shows the direction of Lien's walk?



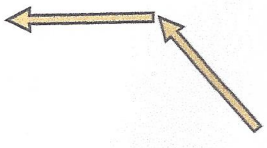
(A)



(B)



(C)



(D)

13. The table shows the cost of renting a DVD for n days.

n (days)	Cost (dollars)
1	4.25
2	5.50
3	6.75
4	8.00
5	9.25

Which of these expressions represents the cost, in dollars, of renting a DVD for n days?

(A) $1.25n + 3$
(B) $1.25 \div 3n$
(C) $n + 3.25$
(D) $3n \times 1.25$

14. 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

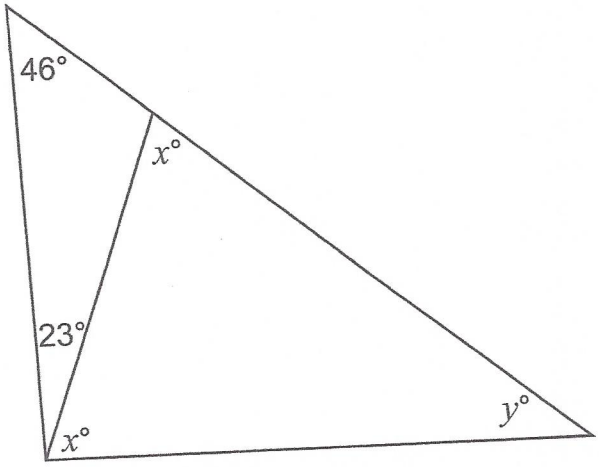
15. Jess had 70 flowers and 8 vases.

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

16. What is the value of y?



NOT TO SCALE

(A) 23
(B) 42
(C) 46
(D) 69

17. 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.

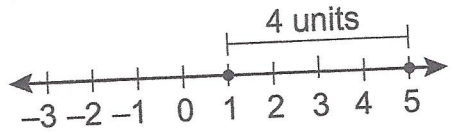
Their pet bird flies back and forth between them at an average speed of 15 km/h.

What distance has the bird flown after two hours?

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

18. 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 $|M - N| = 4$.

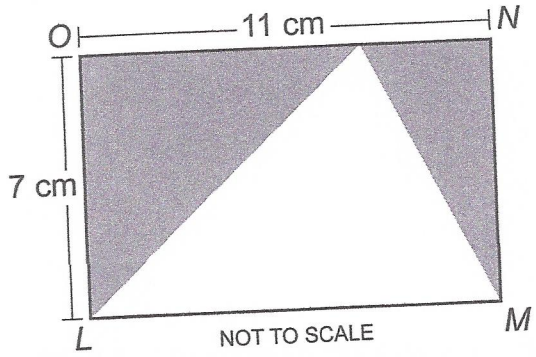


Anish selected other numbers for M and N and the result of $|M - N|$ was 6.

Which two numbers could Anish have selected?

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

19. $LMNO$ 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

20. 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)

21. 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?

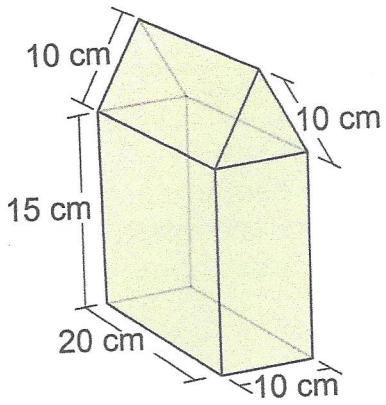
(A) 9
(B) 10
(C) 21
(D) 30

22. Which of these fractions has the greatest value?

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

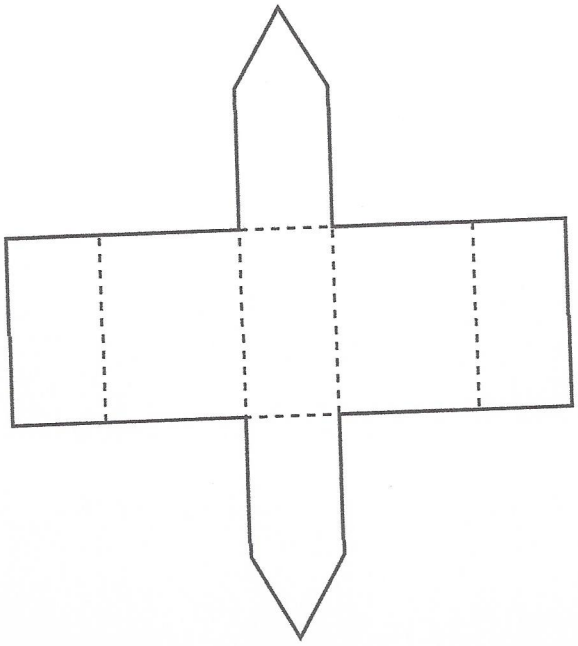
(C) $\frac{88}{99}$ (D) $\frac{7}{8}$

23. Mario is building a model shed as shown in the picture.



NOT TO SCALE

Mario draws this net of the model.

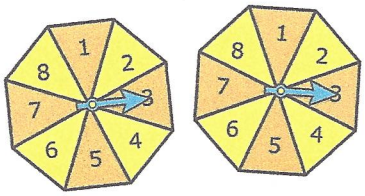


NOT TO SCALE

What is the perimeter, in cm, of Mario's net?

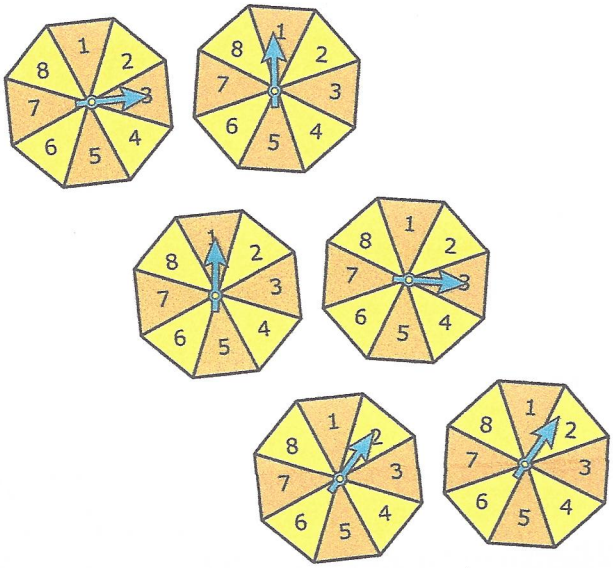
(A) 270
(B) 240
(C) 220
(D) 200

24. 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.

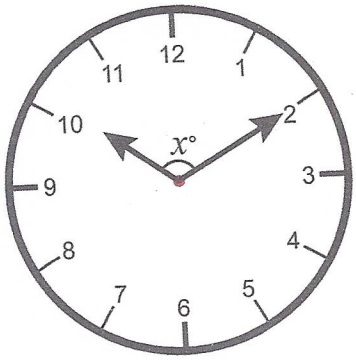


Which two totals can she get in exactly **six** different ways?

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

25. This picture shows the face of a clock.

When the time is 10:10, the hour hand and the minute hand form angle x as shown.

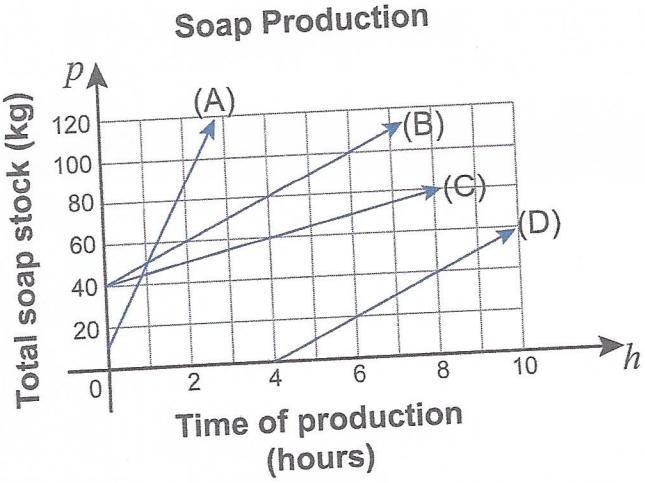


What is the value of x?

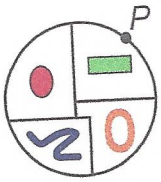
(A) 90
(B) 115
(C) 120
(D) 125

26. On a particular day, a soap factory has 40 kg of soap in stock. The factory produces a further 10 kg of soap every hour.

Which line shows the total soap stock p kg, after h hours of production during that day?

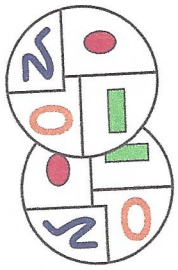


27. Yara created a picture on her computer.

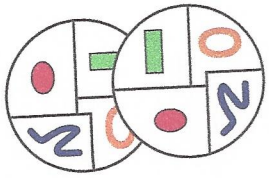


To create a design, she made a copy of the picture and rotated the copy 90° anticlockwise about the point P.

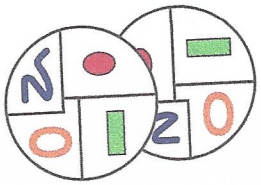
Which of the following was her design?



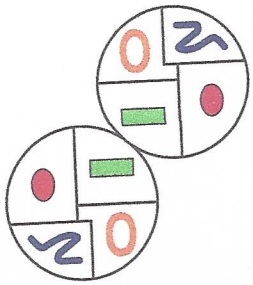
(A)



(B)

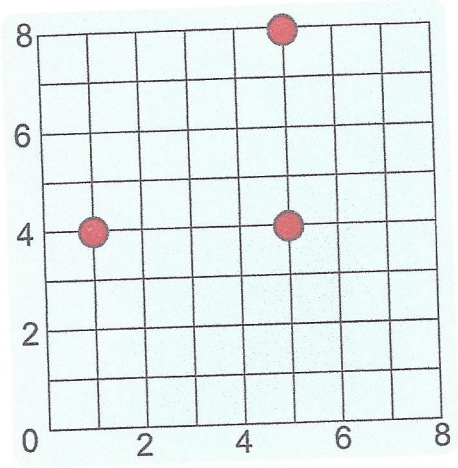


(C)



(D)

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

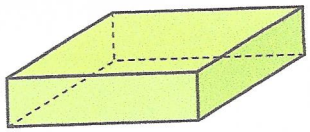


Manling drew another point on the grid which was an equal distance from each of the other three points.

What are the coordinates of the fourth point?

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

29. Anish has a cardboard box with a square base.



NOT TO SCALE

The area of the base is 576 cm^2. The height of the box is equal to half the length of the base.

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

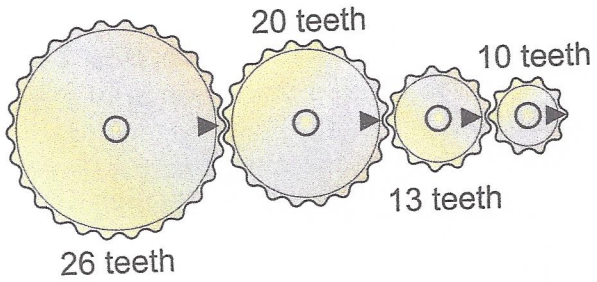
(A) 3456
(B) 6912
(C) 27648
(D) 41472

30. Yara has a supply of cubes. Each cube has a volume of 3 cm^3. She also has a container measuring 6 cm × 6 cm × 3 cm.

What is the maximum number of cubes Yara can pack inside the container?

(A) 4
(B) 27
(C) 32
(D) 36

31. 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

32. The first 99 positive odd numbers are multiplied together.

What is the units digit of this product?

(A) 1
(B) 3
(C) 5
(D) 9

33. Income tax is a sum of money collected by governments from taxpayers. Often, it is calculated as a percentage of their income.

Listed below are four possible systems of taxing income.

System 1: All income is taxed at 20%.

System 2: \$0–\$10 000 is tax free. Then a 25% tax applies on any amount over \$10 000.

System 3: \$0–\$20 000 is tax free. Then a 30% tax applies on any amount over \$20 000.

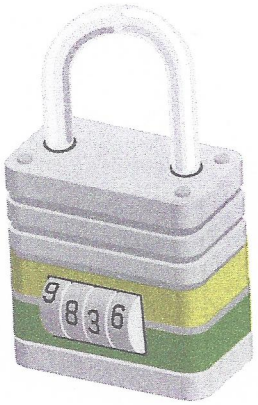
System 4: \$0–\$30 000 is tax free. Then a 40% tax applies on any amount over \$30 000.

Natalia has an income of \$50 000.

Under which system would Natalia pay the **least** amount of tax?

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

34. Jess bought a bike lock with a 4-digit code. Each digit can be any number from 0 to 9.



To open the lock the correct combination of the four digits must be used.

Jess forgot the code, but remembered that it contained exactly one 3.

What is the maximum number of different combinations that Jess may have to try?

(A) 729
(B) 1000
(C) 2916
(D) 4000

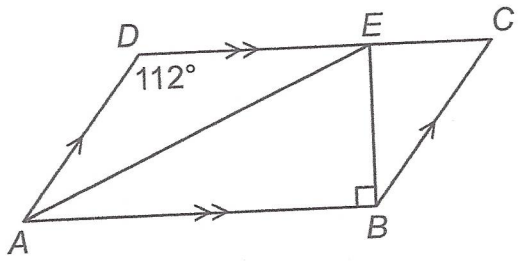
35. How many digits are there in the answer for $2^{120} \times 5^{123}$ when this answer is written without indices?

(A) 122
(B) 123
(C) 124
(D) 243

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. $ABCD$ is a parallelogram. E lies on DC so that $\angle DAE = \angle BAE$.



What is the size of $\angle BEA$, in degrees?

37. A clothing factory produces black, red and green dresses.

During a stock count, it was found that there were 200 black dresses, that one quarter of the total number of dresses were red and that there were half as many green dresses as there were red dresses.

How many red dresses were in the factory?

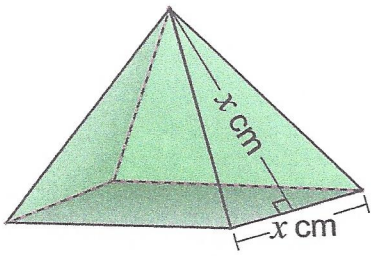
38. A farmer put a goat in a fenced square field with a side length of 50 m.

The goat was tied to one of the corner posts so it could move no more than 30 m from that corner.

Over what percentage of the area of the field could the goat move, to the nearest whole number?

(Write your answer without the percentage sign.)

39. The diagram shows a square pyramid.



NOT TO SCALE

Each triangular face has a perpendicular height the same length as the side of the square base.

The sum of the areas of all faces including the base of the pyramid is 38 988 cm^2.

What is the value of x, to the nearest cm?

40. Some girls took a speed typing test, in which they had to type a certain line as many times as they could in a given time.

The girls sat in a row. After the test each girl discovered that the girl on her left typed twice as much as she did.

The teacher noted that each girl typed a whole number of lines and that the girls typed 635 lines in total.

How many girls took the test?

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