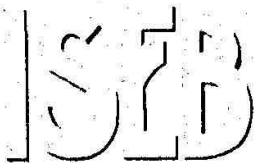


SURNAME FIRST NAME
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JUNIOR SCHOOL SENIOR SCHOOL



Independent Schools
Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

MATHEMATICS

PAPER 4: Calculator Paper

Practice Paper 2006–2007

Please read this information before the examination starts.

- This examination is 60 minutes long.
- All questions should be attempted.
- A row of dots denotes a space for your answer.
- Where answers are not exact they should be given to three significant figures, unless specified otherwise.
- The π button on your calculator should be used for calculations involving π .

1. (a) (i) Writing down all the figures shown on your calculator, find the value of

$$\frac{54.2}{(2.64 + 3.125)^3}$$

Answer: (2)

- (ii) Write your answer to part (a) (i) correct to 3 decimal places.

Answer: (1)

- (b) (i) Writing down all the figures shown on your calculator, find the value of

$$\frac{\sqrt{15.4 - 3.88^2}}{51.6}$$

Answer: (2)

- (iii) Write your answer to part (b) (i) correct to 2 significant figures.

Answer: (1)

2. (a) Julian and Harry want to buy new skateboards.



- (i) Julian decides to buy a ready-made board costing £120. He finds a shop that will give him a 15% discount.

How much does Julian spend on his new skateboard?

Answer: £..... (2)

- (ii) Harry decides to build his own. He needs a deck, a set of trucks and 4 wheels.

deck	£60
set of trucks	£24
wheels	£4.50 each

Harry finds a shop that will give him one-third off the displayed prices.

How much does Harry spend on buying the parts for his new skateboard?

Answer: £..... (3)

- (b) I bought a modern painting for £1600
Ten years later I sold the painting for £4000
What was my percentage profit?



Answer: % (2)

3. (a) Simplify

(i) $4n^2 - 6n - n^2$

Answer: (1)

(ii) $(3n)^2 \times n^2$

Answer: (2)

(iii) $\frac{12n^2}{20n^3}$

Answer: (2)

(b) Multiply out the brackets and simplify

$4b(2a - 3) - 3a(b + 3)$

Answer: (3)

(c) Factorise completely

$18ac^2 - 12a^2c$

Answer:

4. (a) Solve the following equations.

(i) $4 - a = -16$

Answer: $a = \dots\dots\dots$ (1)

(ii) $\frac{2}{3}b + 2 = 14$

Answer: $b = \dots\dots\dots$ (2)

(iii) $3(4c + 2) = 10 - 4(c - 2)$

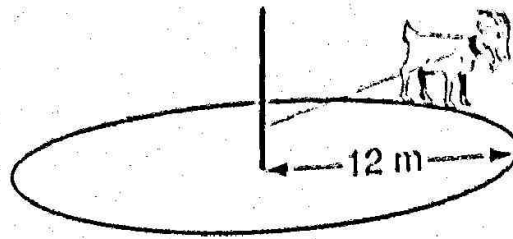
Answer: $c = \dots\dots\dots$ (3)

(b) (i) Solve the inequality $48 - 12d > 3$

Answer: $\dots\dots\dots$ (2)

(ii) List all the positive integers which satisfy the inequality in part (b) (i).

5. Grumble the Goat is tied by a 12 metro rope to a post. As a protest of this lack of personal freedom, he runs round the post in a circular path, keeping the rope taut.



- (i) (a) Find the circumference of Grumble's circular path.

Answer: m (2) 0

Grumble completes 100 circuits of the path.

- (b) Find the total distance travelled by Grumble in kilometres.

Answer: km (2)

Grumble's run lasts 40 minutes.

- (c) Find Grumble's average speed in kilometres per hour. 0

Answer: km/h (2)

Realising that this has had no effect, Grumble decides to eat all the grass he can reach.

- (ii) Calculate the area of grass eaten, giving your answer to the nearest 10 m^2 .

Answer: m^2 (2)

6. (i) If $y = 1 - \frac{1}{2}x$ complete the table of values below.

x	-3	0	3
y			

(2)

(ii) On the grid below, draw and label the line $y = 1 - \frac{1}{2}x$

(1)

(iii) If $y = \frac{1}{2}x^2 - 1$ complete the table of values below.

x	-3	-2	-1	0	1	2	3
y			$-\frac{1}{2}$			1	

(2)

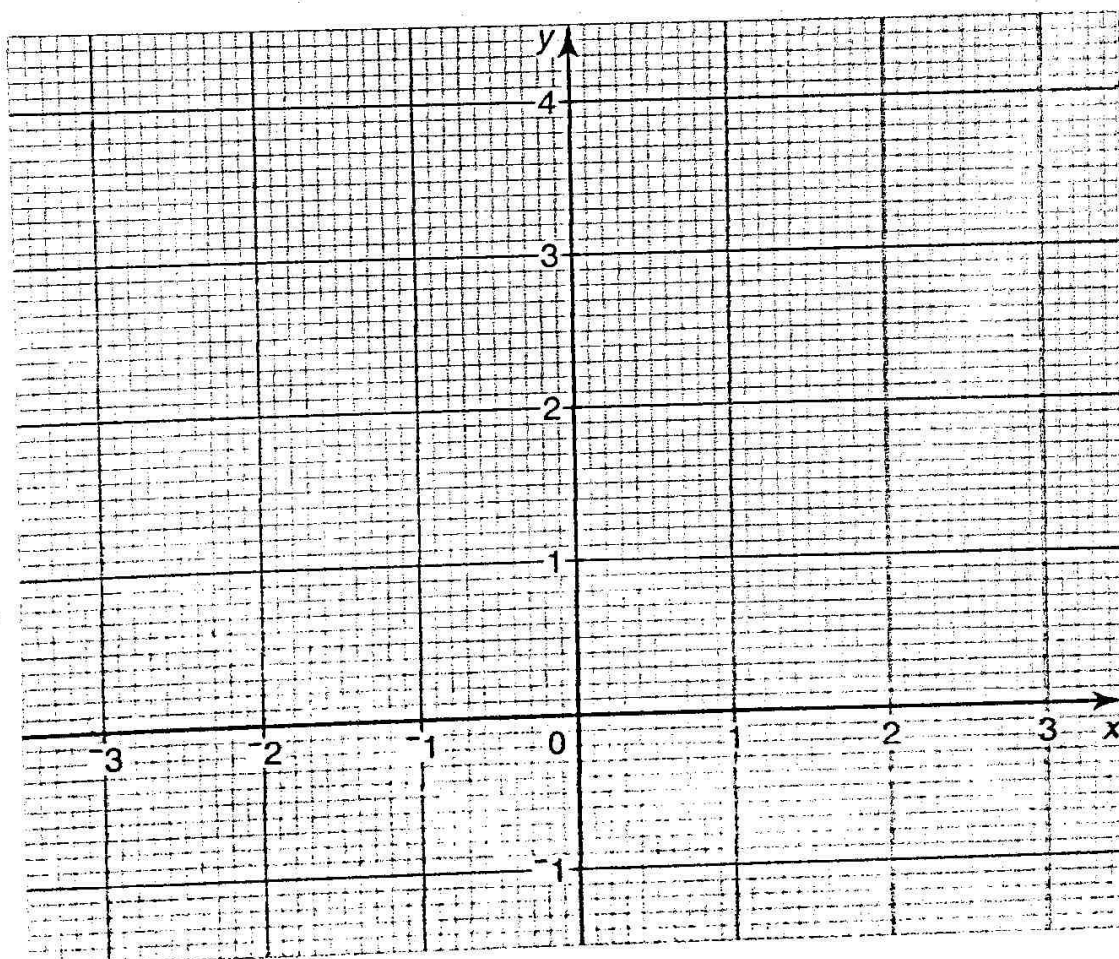
(iv) On the grid below, draw and label the curve $y = \frac{1}{2}x^2 - 1$

(2)

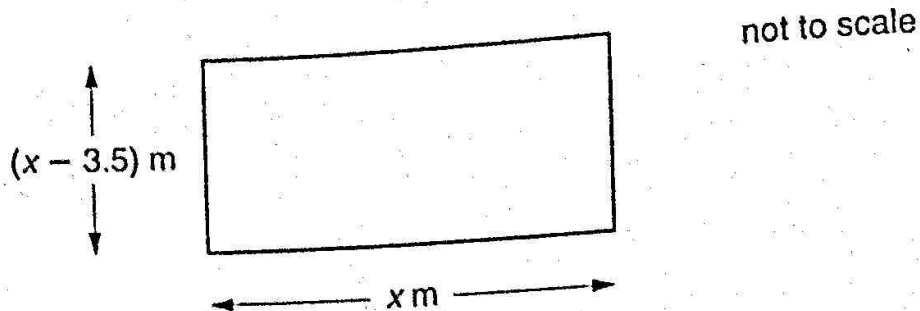
(v) Write down the coordinates of the points of intersection of the line and the curve.

Answer: (.....,) and (.....,)

(2)



7. A rectangular room is x metres in length. Its width is 3.5 metres less than its length.



- (i) Write an expression, in terms of x , for the area of the room.

Answer: m^2 (1)

The area of the room is 32 m^2 .

- (ii) Using a trial-and-improvement method, find to the nearest 10 cm, the length of the room.

The table below should be used to record your working.

x	$x - 3.5$	area

Answer: $x =$ m (4)

- (iii) Use your answer to part (ii) to calculate the perimeter of this room.

Answer: m (2)

8. Milly (*M*) and Zoë (*Z*) are looking for buried treasure.
 Zoë is standing 20 metres away from Milly on a bearing of 050° .



(2)



Captain Flint tells them that if Milly walks on a bearing of 080° and Zoë walks on a bearing of 125° , their paths will cross at the treasure.

(ii) Draw their paths on the diagram, and mark the position of the treasure (*T*). (3)

(iii) How far does Milly walk to reach the treasure?

Answer: m (2)

(iv) If Milly walks at 2.5 m/s, how long does it take her to reach the treasure?

Answer: s (2)

9. Here are the results of 10 children who took part in the long jump and the 100 metres race in a recent athletics competition:



long jump distance, in metres	3.20	3.46	3.52	3.66	4.20	3.80	4.04	4.02	3.88	4.36
100 m time, in seconds	13.5	13.1	13.2	13.0	12.4	12.8	13.4	12.7	12.7	12.2

The first four pairs of results have been plotted on the grid opposite.

- (i) Plot the remaining six pairs of results on the grid opposite. (3)
- (ii) Circle the point on the scattergraph which seems to be out of place. (1)
- (iii) Ignoring the point which is out of place, draw the line of best fit. (1)
- (iv) What sort of correlation is shown by these results? (1)

Answer: (1)

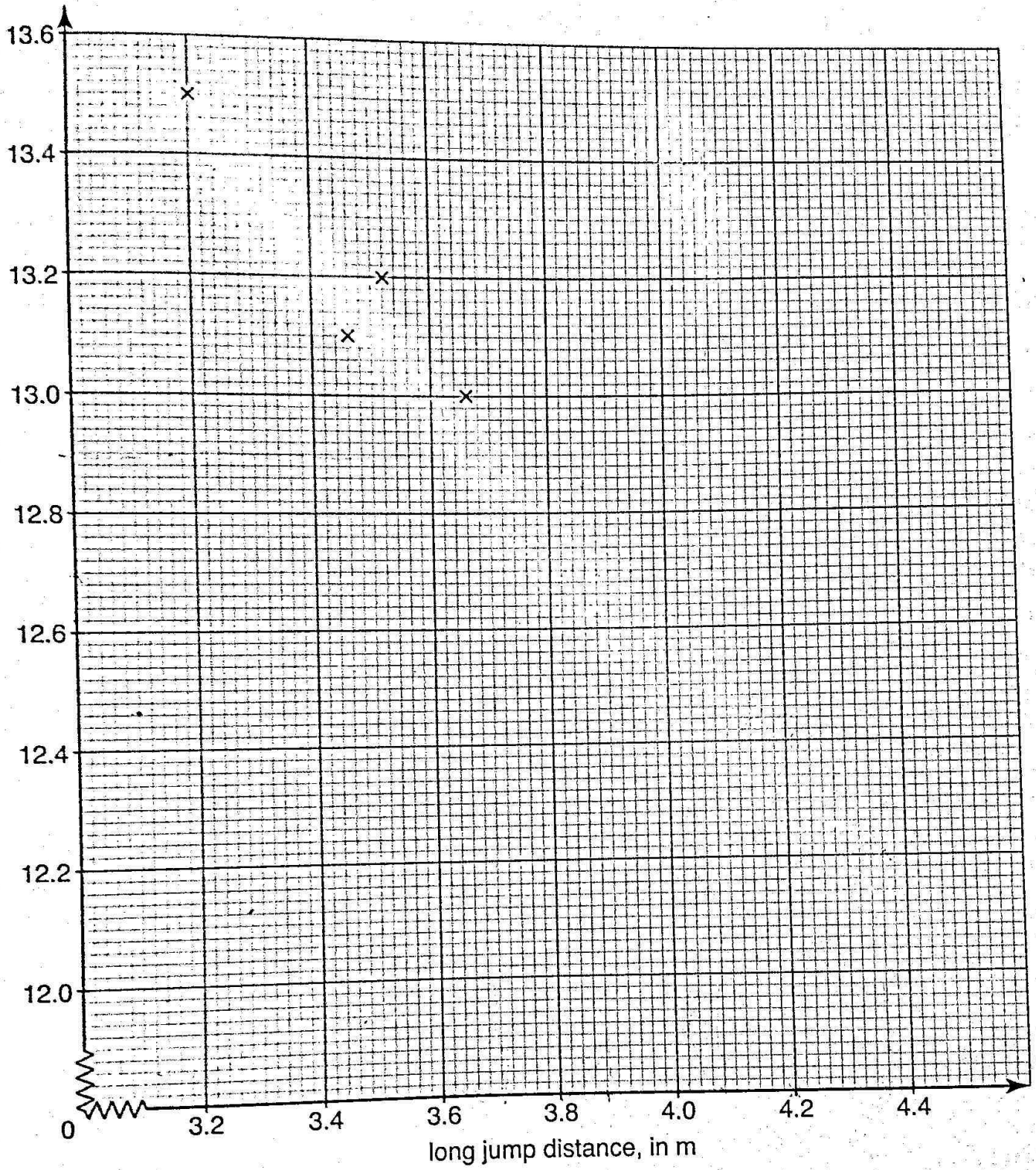
- (v) Who jumped further in this competition – fast runners or slow runners?

Answer: (1)

Ed sprained his ankle after jumping 3.70 metres in the long jump.

- (vi) Showing where you take your reading, use your line of best fit to predict the time Ed would have taken in the 100 metres race, to the nearest hundredth of a second.

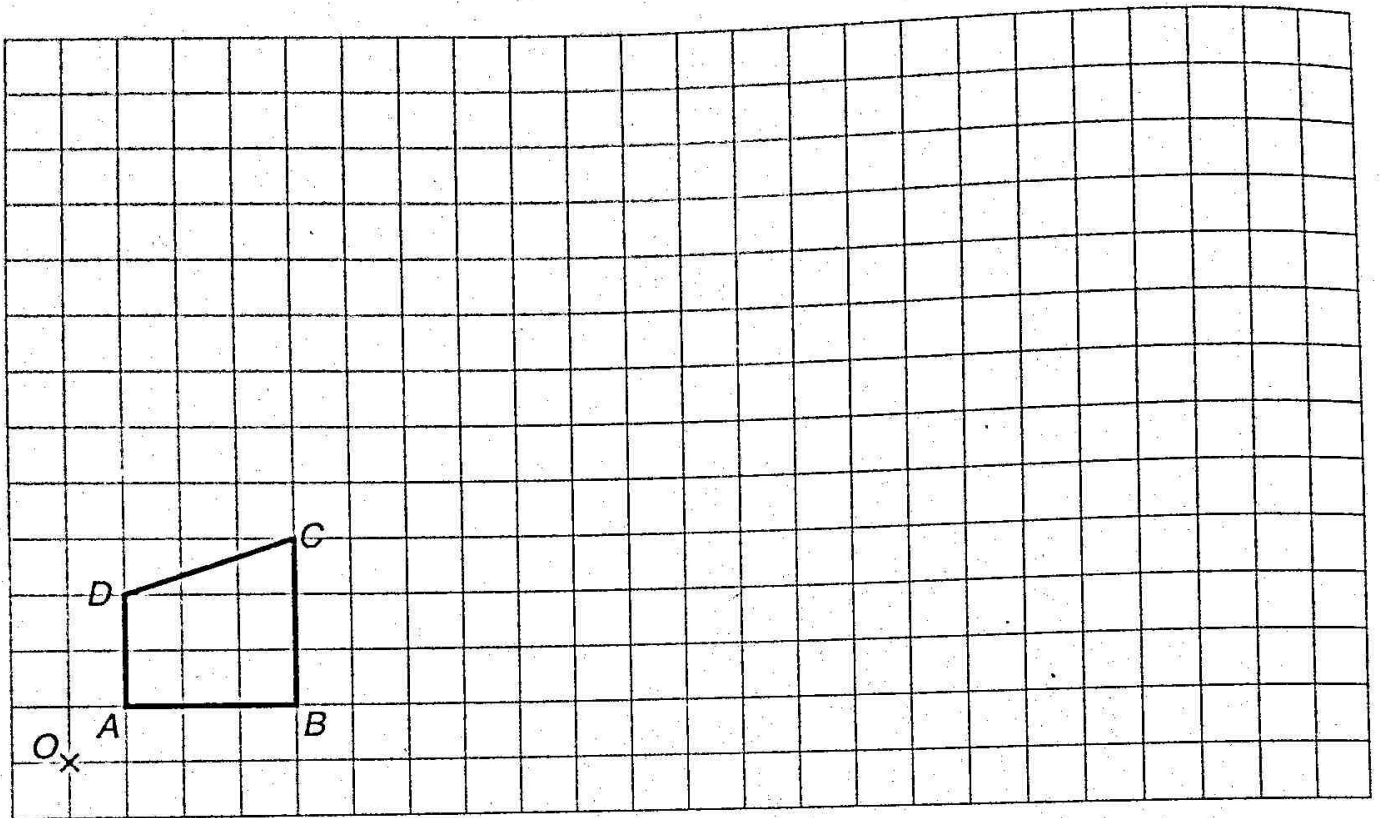
Answer: s (2)



10. (a) (i) With centre O and scale factor 3, draw the enlargement of $ABCD$.

Label the new shape $A'B'C'D'$.

(2)



(ii) AB is 3 units long. What is the area of shape $A'B'C'D'$?

Answer: units² (2)

(b) I enlarge shape P into shape Q .
Shape P has an area of 9 units².
Shape Q has an area of 144 units².

(i) What is the scale factor of the enlargement?

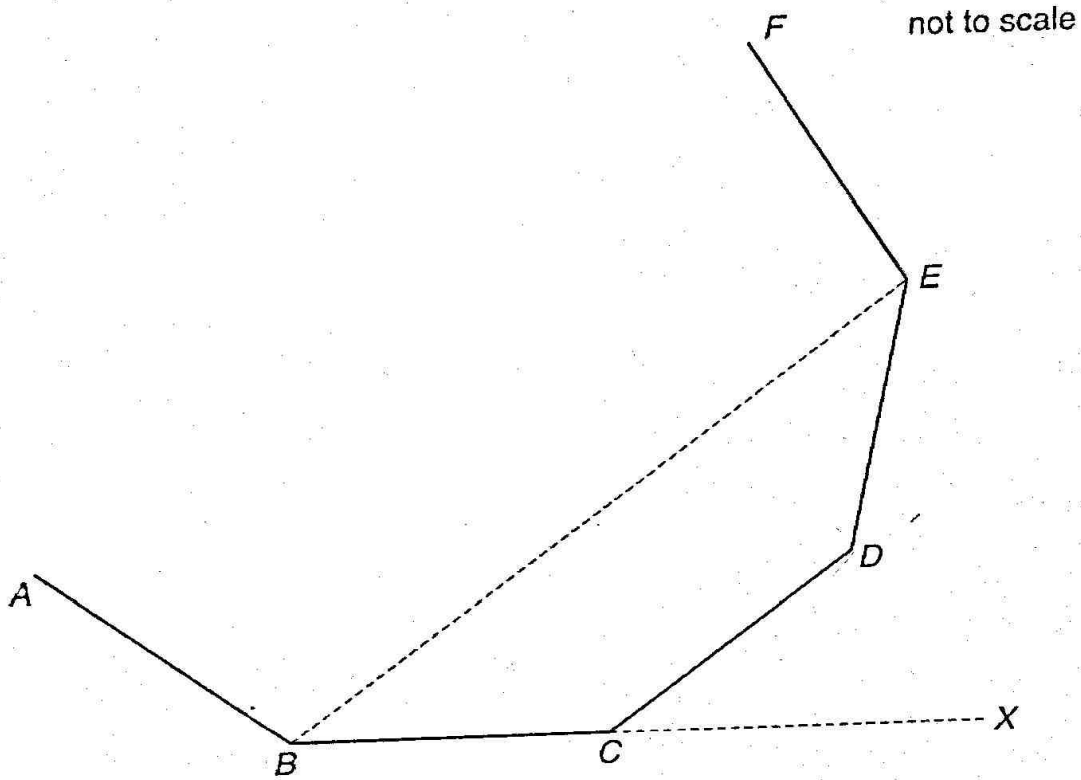
Answer: (2)

The perimeter of shape Q is 50 units.

(ii) What is the perimeter of shape P?

Answer: units (1)

11.



ABCDEF is part of a regular nonagon. *BC* is extended to *X*. *B* is joined to *E*. Calculate the size of

(i) angle *DCX*

Answer: (2)

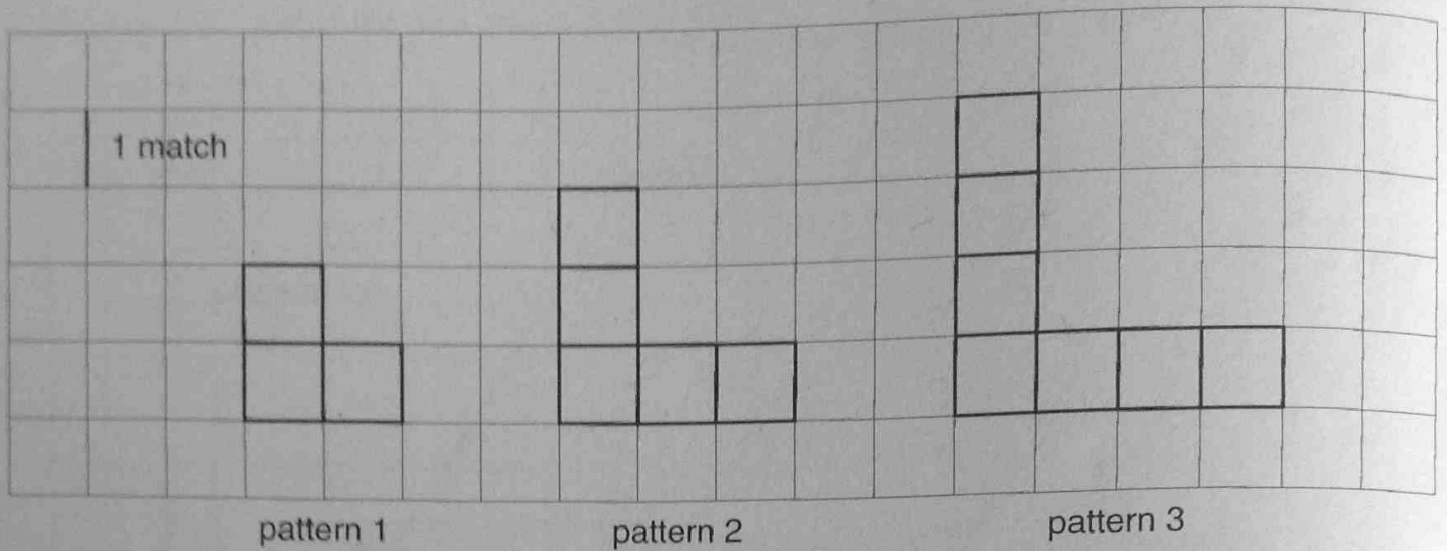
(ii) angle *BCD*

Answer: (1)

(iii) angle *ABE*.

Answer: (2)

12. Here are the first three patterns in a sequence of L-shapes made with matches:



(i) Draw pattern 4 below.

(1)



(ii) Complete the table for patterns 1 to 4

pattern number	1	2	3	4
number of small squares	3			
number of matches on perimeter	8			
number of matches in total	10			

(3)

(iii) How many small squares are there in pattern 10?

Answer: (1)

(iv) How many matches in total are there in the n th pattern?
Give your answer in terms of n .

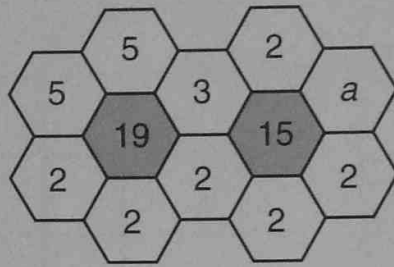
Answer: (2)

(v) If I use a total of 124 matches to make a similar L-shape, how many matches will be on the perimeter?

Answer: (2)

Turn over

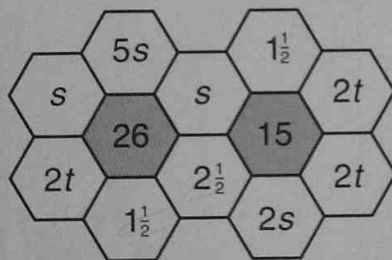
13. The six numbers round a shaded hexagon add up to the number inside it.



(i) Calculate the value of a .

Answer: $a = \dots\dots\dots$ (1)

(ii) Using the diagram below, write down two equations, in terms of s and t , and solve them simultaneously to find the values of s and t .



Answer: $s = \dots\dots\dots$

$t = \dots\dots\dots$ (4)

(Total marks: 100)