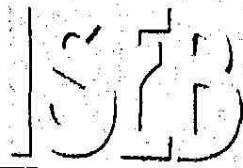


SURNAME FIRST NAME

JUNIOR SCHOOL SENIOR SCHOOL



Independent Schools
Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

MATHEMATICS

PAPER 4: CALCULATOR PAPER

Practice Paper 2008–2009

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. (i) Rewrite the following calculation with each number correct to 1 significant figure:

$$\frac{31.82 \times 2.49}{22.4 - 4.99}$$

Answer: $\frac{\dots\dots\dots \times \dots\dots\dots}{\dots\dots\dots - \dots\dots\dots}$ (2)

- (ii) Calculate the value of your answer in part (i).

Answer: (1)

- (iii) Writing down all the figures shown on your calculator, find the exact value of the calculation in part (i).

Answer: (2)

- (iv) Write your answer to part (iii) correct to

(a) 2 decimal places

Answer: (1)

(b) 2 significant figures

Answer: (1)

2. Look at this sequence of Fibonacci numbers:

1 2 3 5 8 21 89

(i) Write down the three missing terms.

Answer:,, (2)

(ii) From this list of 10 numbers, and **using them only once**, write down two numbers which are

(a) multiples of 3

Answer:, (2)

(b) cube numbers

Answer:, (2)

(c) two-digit prime numbers

Answer:, (2)

(d) factors of 40

Answer:, (2)

3. The two digits of 29 are 2 and 9

Write down a multiple of 12 whose two digits add up to 12

Answer: (2)

4. (a) Simplify

(i) $2a^2 + 4a^2$

Answer: (1)

(ii) $2b - 4b^2 + 3b$

Answer: (1)

(iii) $3a \times 4a^2b^3$

Answer: (2)

(iv) $\frac{2n^2 + 4n^2}{2n}$

Answer: (2)

(b) Multiply out the bracket and simplify

$10b + 10 - 3(2b + 5)$

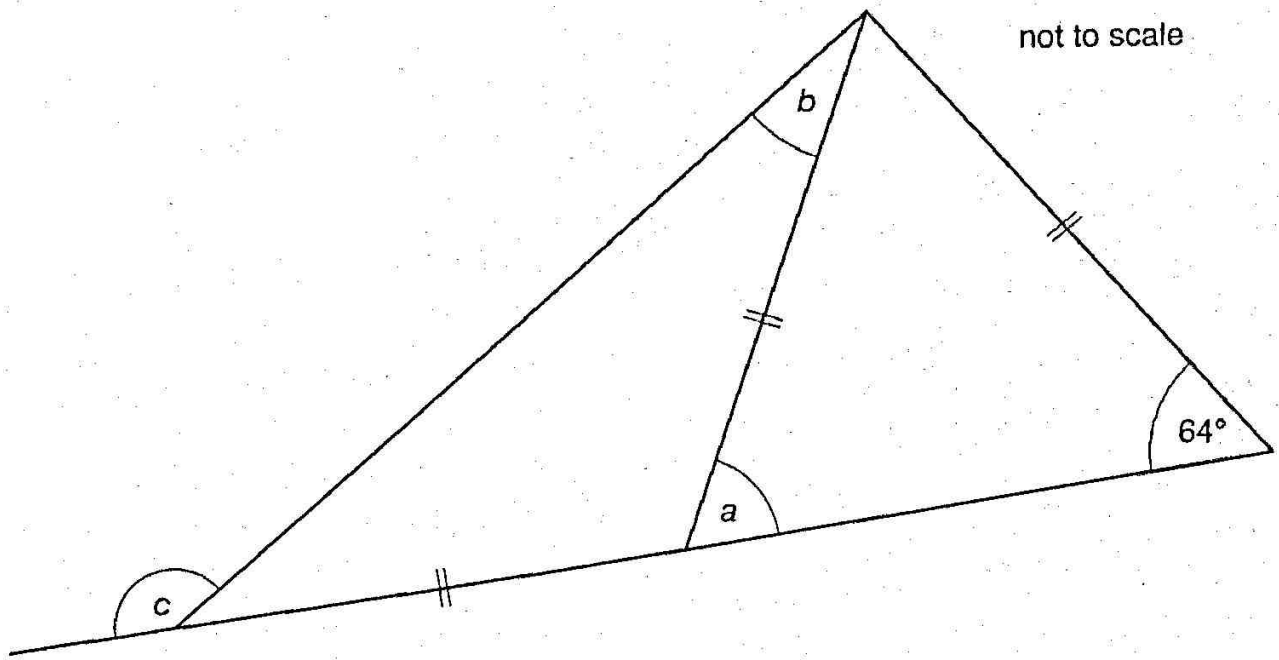
Answer: (2)

(c) Factorise completely

$24bc - 36b^2$

Answer: (2)

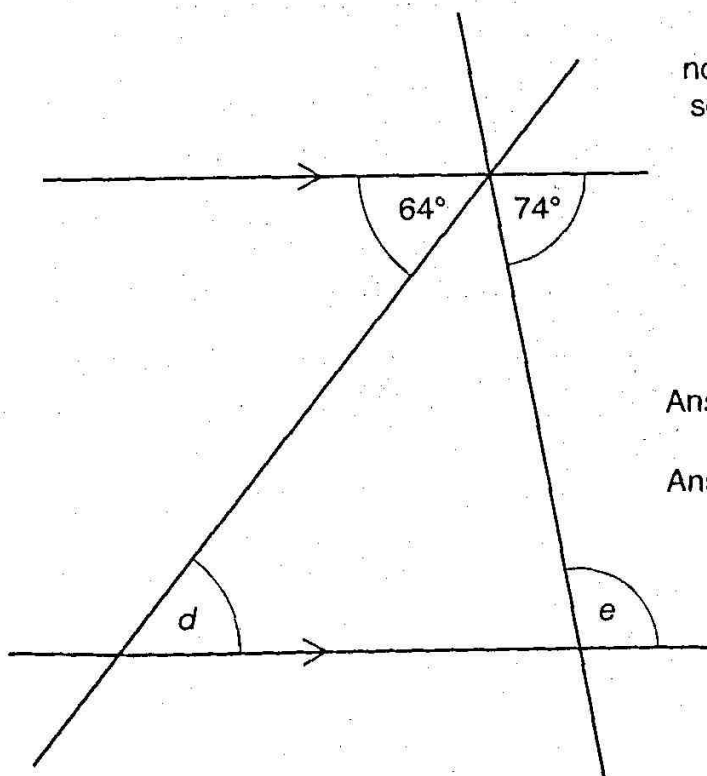
5. Calculate the size of each of the angles marked a , b , c , d and e .



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

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

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



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

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

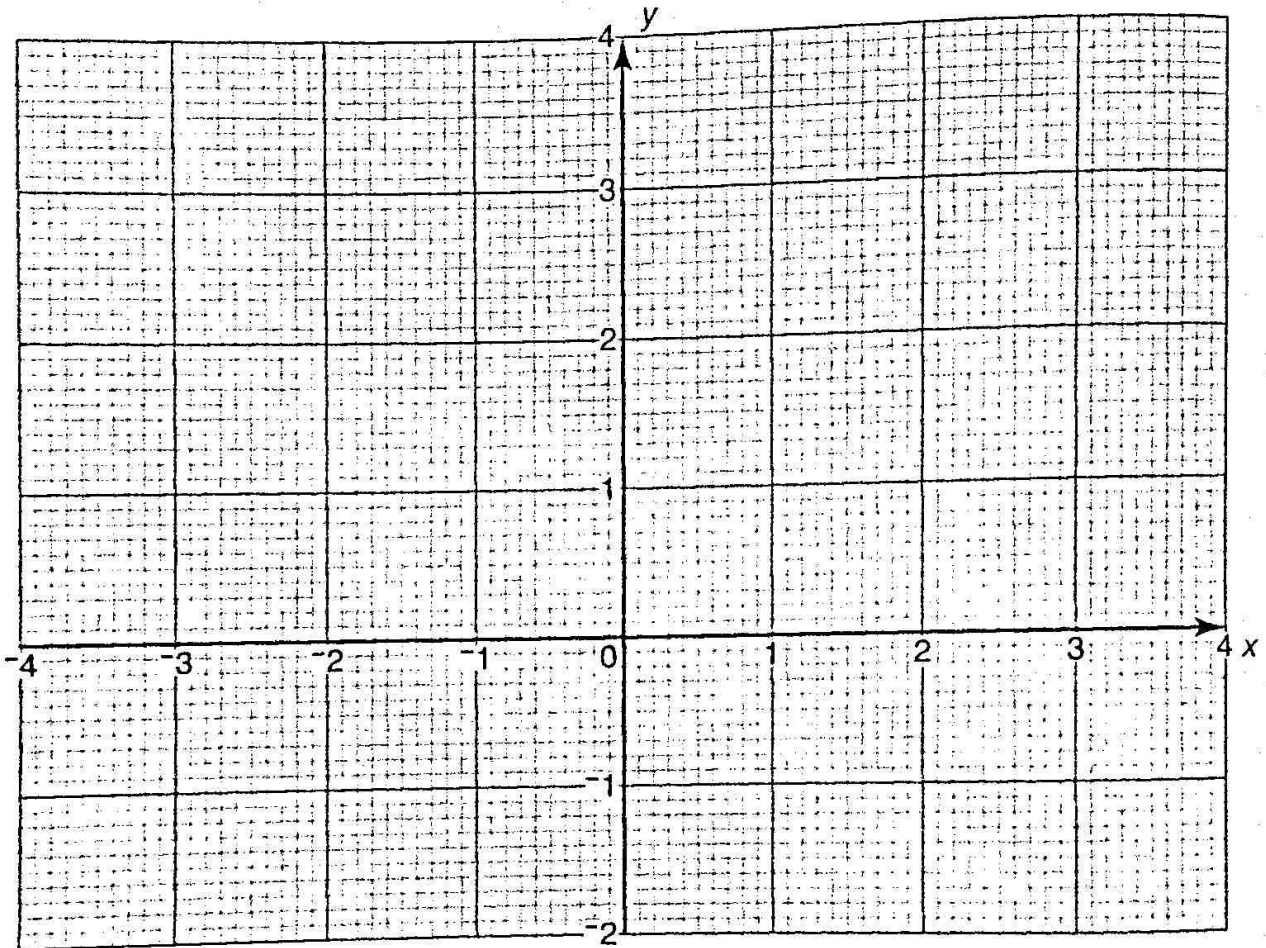
6. (i) If $3y = 3 - x$ complete the table of values below.

x	0	3
y		

(2)

(ii) On the grid below, draw and label the line $3y = 3 - x$

(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 opposite, draw and label the curve $y = \frac{1}{2}x^2 - 1$

(2)

(v) Write down the x co-ordinate of each point of intersection of the line and the curve.

Answer: and (2)

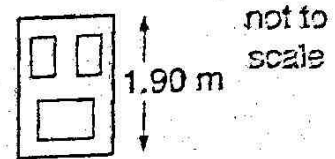
7. (a) 1 inch = 2.54 centimetres.



- (i) A piece of string is 64 inches long.
Write this length in centimetres.
Give your answer correct to 1 decimal place.

Answer: cm (2)

- (ii) A door is 1.90 metres high.
Write this height in inches correct to the nearest inch.

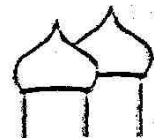


Answer: inches (2)

- (b) To convert a temperature measured in degrees Fahrenheit ($^{\circ}\text{F}$) to one measured in degrees Celsius ($^{\circ}\text{C}$), the following formula is used:

$$C = \frac{5}{9}(F - 32)$$

- (i) The temperature in Russia is -4°F .
Calculate this temperature in degrees Celsius.



Answer: $^{\circ}\text{C}$ (1)

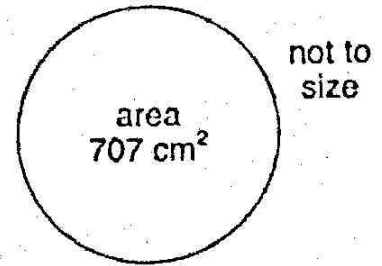
- (ii) Theo has a temperature of 40°C .
Calculate his temperature in degrees Fahrenheit.



Answer: $^{\circ}\text{F}$ (3)

8. Charlie's Cake Company makes a cylindrical cake of base area 707 cm^2 .

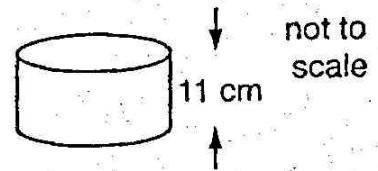
(i) Calculate the radius of the base of the cylindrical cake.



Answer: cm (3)

The cake is 11 cm deep.

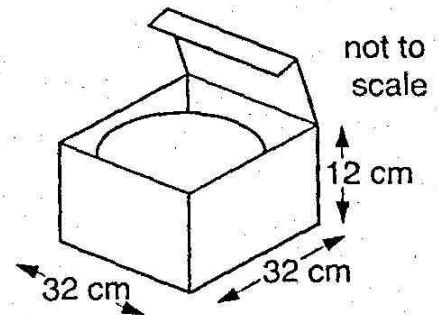
(ii) Calculate the volume of the cake.



Answer: cm^3 (1)

The cake is packed in a rectangular box, measuring 32 cm by 32 cm by 12 cm.

(iii) What percentage of the volume of the box is occupied by the cake?



Answer: % (3)

9. Bob sells second-hand bikes.

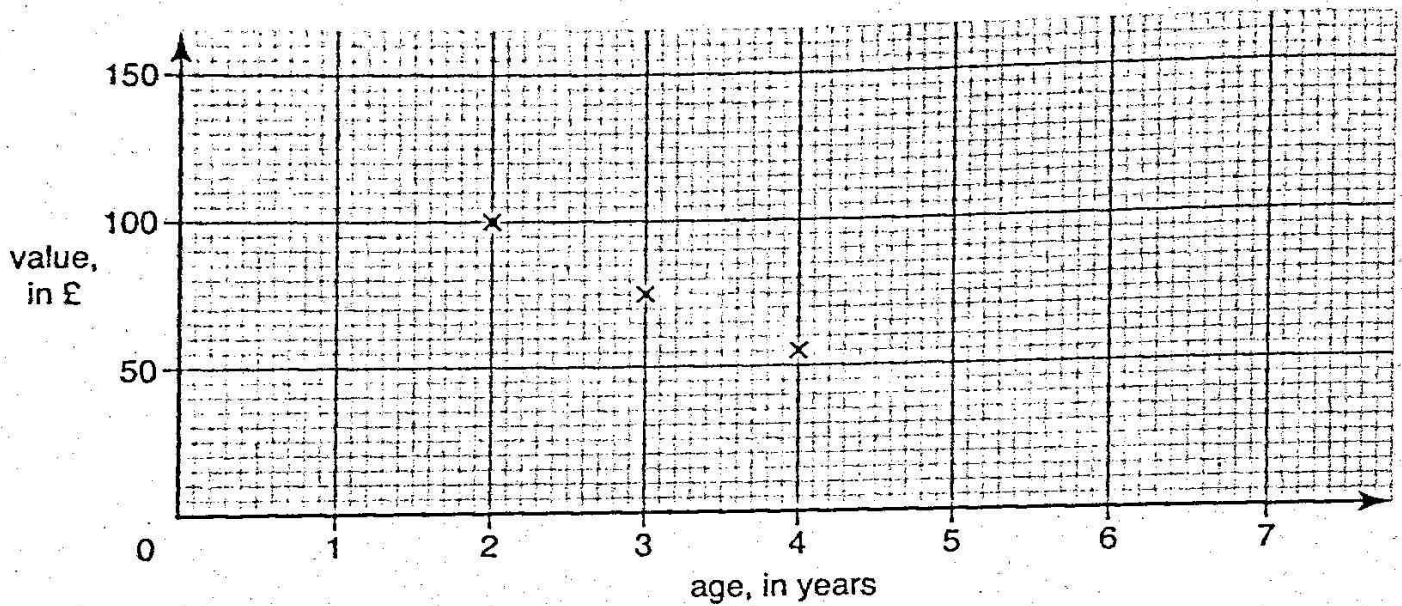
The age and value of each of seven bikes are shown in the table below.

BOB'S
BIKES



age of bike, in years	2	3	4	4	1	6	7
value of bike, in £	100	75	55	70	105	30	20

Bob plots the first three results on a scatter graph.



(i) Plot the remaining four results on the scatter graph. (2)

(ii) Draw a line of best fit on the graph. (1)

(iii) Which sort of correlation is shown on this graph?

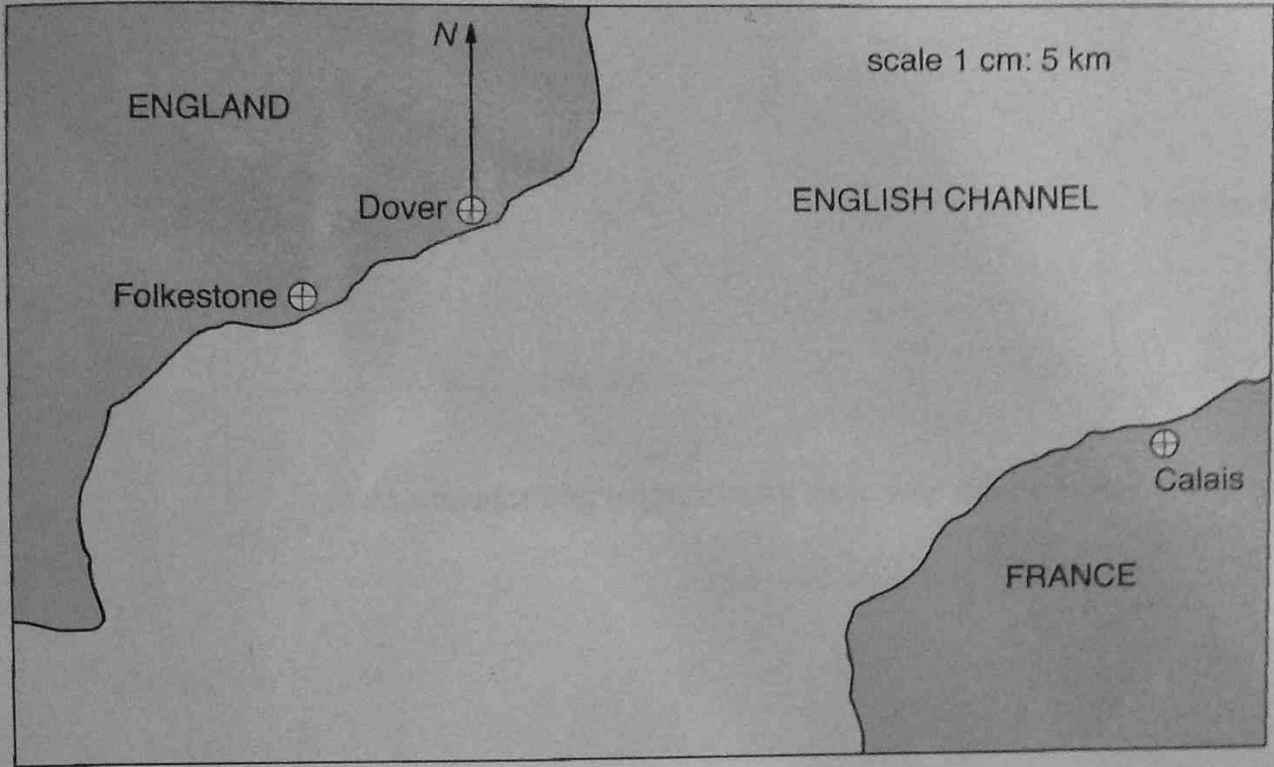
Answer: (1)

A student brings Bob a bike which is 5 years old.

(iv) Use your line to estimate its value, showing clearly where you take your reading.

Answer: £ (2)

10. Sammy the Sailor is lost in the English Channel.



The Dover coastguard says that Sammy is on a bearing of 200° from Dover.

- (i) Draw a line from Dover to show where Sammy could be. (2)

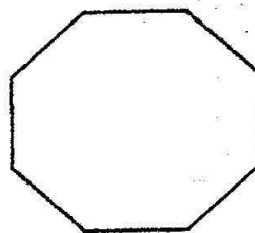
The Calais coastguard says that Sammy is 55 km from Calais.

- (ii) Using a pair of compasses, identify Sammy's exact position. (2)
Mark his position S.

- (iii) To which of the three ports shown is Sammy closest and how long will it take him to get to this port if he sails at an average speed of 15 km/h?

Answer:; it will take him hours minutes (4)

11. (i) (a) Calculate the size of an exterior angle of a regular octagon.



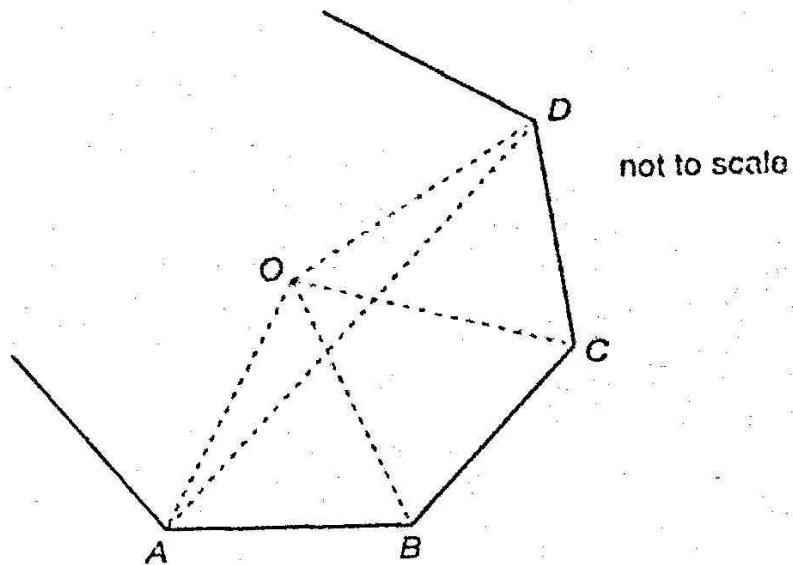
not to
scale

Answer:^o (2)

- (b) Calculate the size of an interior angle of a regular octagon.

Answer:^o (1)

(ii) $ABCD$ forms three of the sides of a regular octagon, centre O .
 Only part of the octagon is drawn below.



Calculate the size of

(a) angle BOC

Answer: $\widehat{BOC} = \dots\dots\dots^\circ$ (2)

(b) angle OBC

Answer: $\widehat{OBC} = \dots\dots\dots^\circ$ (2)

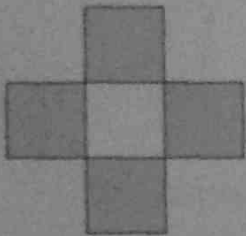
(c) angle OAD

Answer: $\widehat{OAD} = \dots\dots\dots^\circ$ (2)

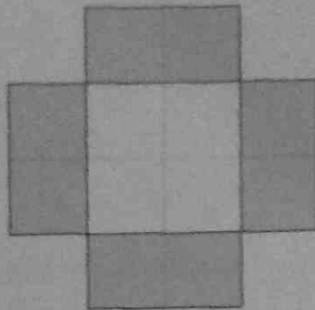
The squares in this question are all 1-centimetre squares.



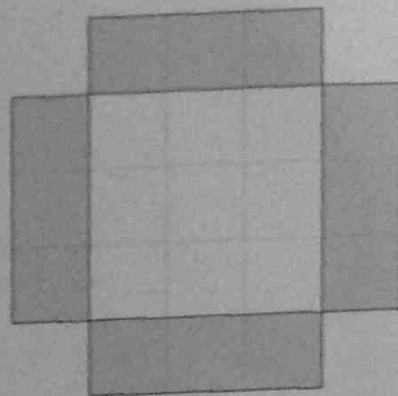
12. Here are the first three patterns in a sequence made of white and grey squares.



pattern 1



pattern 2



pattern 3

(i) Draw pattern 4 below.



(1)

(ii) Complete the table for patterns 1 to 5

pattern number	1	2	3	4	5
number of white squares	1	4	9		
number of grey squares	4	8	12		
total number of squares	5	12	21		

(2)

(iii) How many white squares will there be in pattern 7?

Answer: (1)

(iv) How many squares will there be altogether in pattern 7?

Answer: (2)

The formula for the total number of squares in the n th pattern is $n^2 + 4n$

One pattern contains a total of 837 squares.

(v) Use trial and improvement to calculate how many of these squares are white.

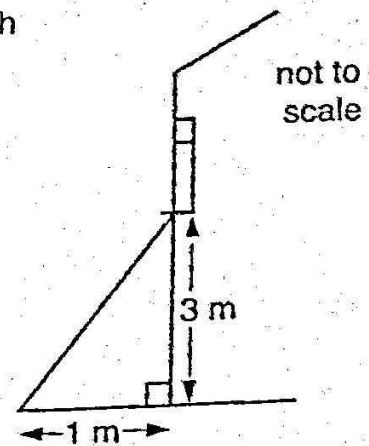
n	n^2	$4n$	total
20	400	80	480

Answer: white squares (4)

13. Felix puts his ladder up against his house.

He places its base 1 metre out from the wall and, when it is its normal length, the ladder just reaches the window ledge, 3 metres above the ground.

(i) Use Pythagoras' Theorem to calculate the normal length of Felix's ladder.



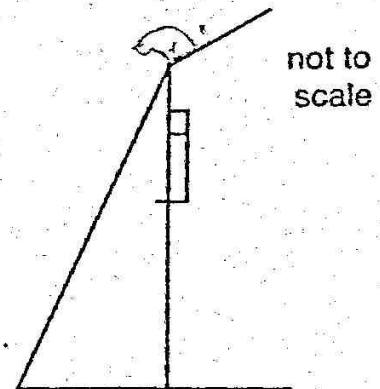
Answer: m (2)

Felix's cat is stuck on the roof.

Felix extends his ladder to twice its normal length and places its base 1.5 m from the wall.

The top of the ladder just reaches his cat.

(ii) At what height is the cat above the window ledge?



Answer: m (4)

(Total marks: 100)

