Mathematics Higher Tier

Non-Calculator Paper: June 2010 Pilot 1st half

Name:

Initial reflection:
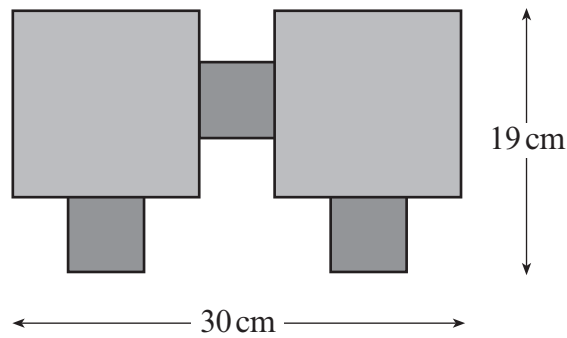
Assessor:

Feedback:

Question	Maximum Mark	Mark Awarded
1	2	
2	8	
3	4	
4	7	
5	4	
6	6	
7	9	
8	5	
9	7	
TOTAL MARK		

Response:

1. The diagram shows 2 identical large square tiles and 3 identical small square tiles.

19 cm

30 cm

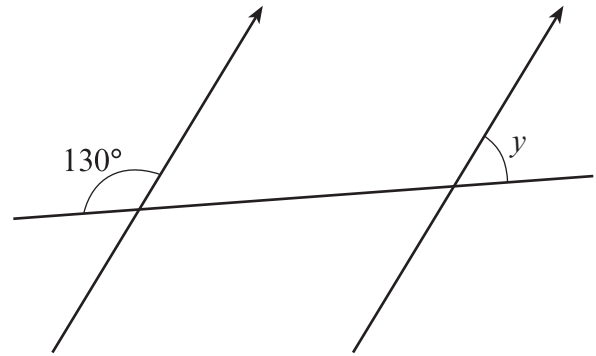Find the length of each of the small square tiles.

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[2]

Turn over.

2. *(a)*
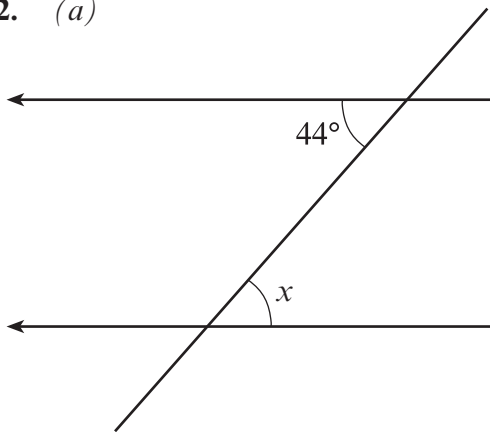
Diagrams not drawn to scale.

Find the size of each of the angles x and y.

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$x =$ ....$^\circ$ $y =$ ....$^\circ$

[3]

(b)
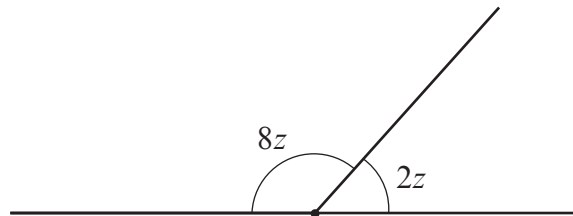
Diagram not drawn to scale.

Find the value of z.

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$z =$ ....$^\circ$

[2]

(c) The diagram below shows a regular octagon.
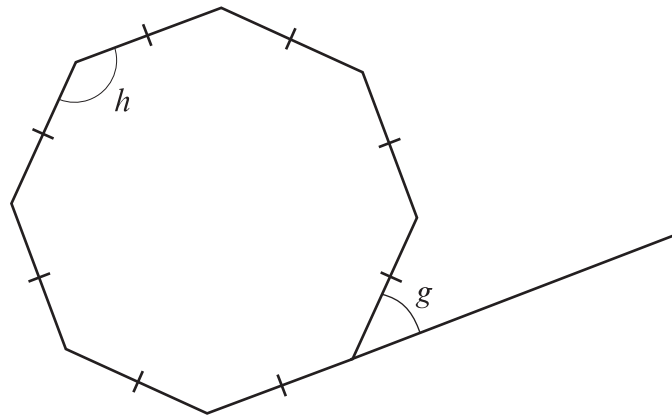
Diagram not drawn to scale.

Find the size of each of the angles marked *g* and *h*.

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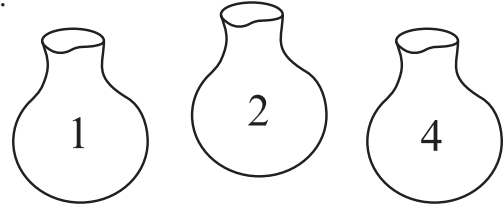
$$g = \text{.................}^{\circ}$$

$$h = \text{.................}^{\circ}$$

[3]

3. *(a)* Three bags each contain a large number of cards.
The cards in the first bag are all numbered 1.
The cards in the second bag are all numbered 2.
The cards in the third bag are all numbered 4.

(i) Six cards are selected from the bags.
The sum of the numbers on the cards selected from the bags is 20.
What are the six numbers on the cards selected?

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(ii) Explain why it is not possible to select four cards from the bags to give a sum of 20.

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[2]

(b) All the cards from the three small bags are put together in one large bag.
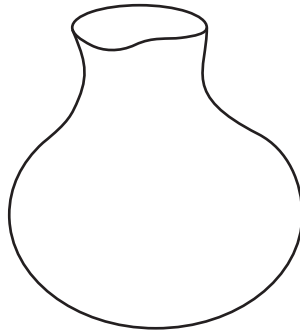
There are 95 cards in the bag.
Twenty cards are numbered 2.
The probability of selecting a card numbered 4 from the bag is twice the probability of selecting a card numbered 2.
How many of the cards are numbered 1?

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[2]

4. Suzanne is considering buying a 12 month contract for a mobile phone.
She usually talks for 130 minutes and sends 280 texts each month.
Here are the details of the two options she is considering.
Both options offer the same free phone with a 12 month contract.

Option "ForeverText"	*Option "Talktime"*
Every month for 12 months, **inclusive of VAT:** Phone calls .... 10p per minute All texts .... FREE	Every month for 12 months: 250 minutes free 400 free texts All for **£12 per month + 17½% VAT**

(a) Find the better option for Suzanne.
How much cheaper is this option each month?

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[5]

(b) Suzanne's sister Joanna usually talk for about 220 minutes per month and does not send any texts.
Explain why "Talktime" is the better option for Joanna.

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[2]

Turn over.

5. Look at the grid.
The total of each column is shown under the grid.

a	b	c	a
a	c	c	b
b	c	c	c
b	c	c	d
10	26	32	0

Find the values of a, b, c and d.

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$a =$ .... $b =$ .... $c =$ .... $d =$ ....   [4]

6. Square patterns are made using matchsticks.
A matchstick can be placed horizontally — or vertically │ .
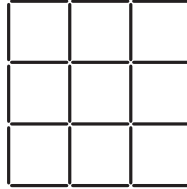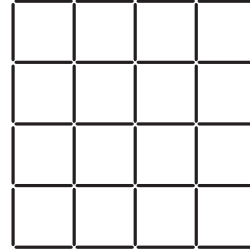
Pattern 1   Pattern 2   Pattern 3   Pattern 4

There are 12 matchsticks in Pattern 2.

(a) Complete the following table.

Pattern Number	Number of horizontal matchsticks	Number of vertical matchsticks	Total number of matchsticks
1	2	2	4
2			12
3			24
4			

[1]

(b) (i) Find how many **horizontal** matchsticks are in Pattern 7.

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(ii) State how many **vertical** matchsticks are in Pattern 7.

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[2]

(c) Find how many **vertical** matchsticks are in Pattern 10.

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[1]

(d) Find the rule, in terms of *n*, for working out how many **vertical** matchsticks are in Pattern *n*.

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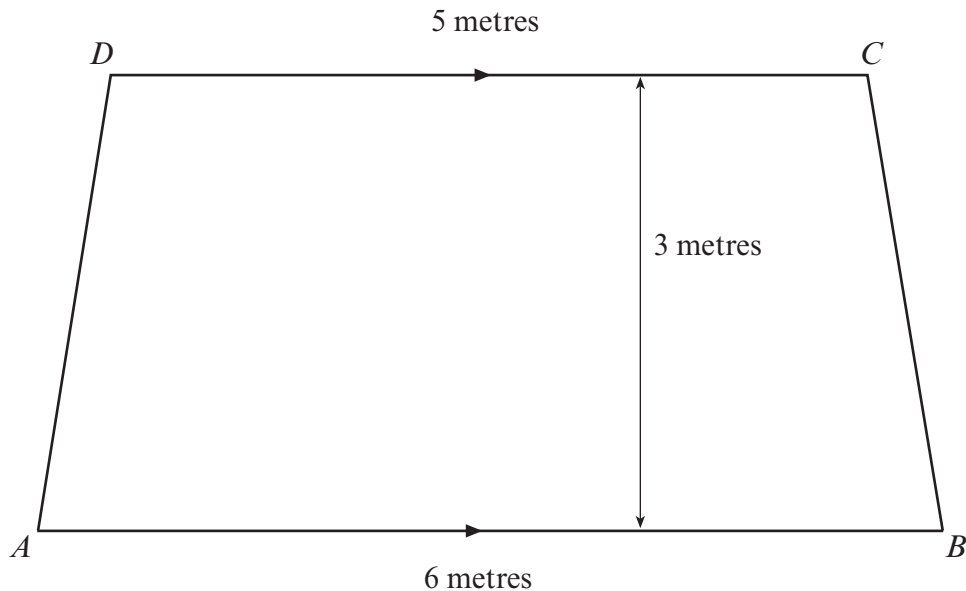
[2]

Turn over.

7. Rhian decides to plan her garden with a lawn in the shape of a trapezium.
A scale drawing of the lawn is shown below.

5 metres

D   *C*

3 metres

A   *B*

6 metres

(a) Write down the scale of the diagram by completing the following sentence.
State the unit that you use.

1 cm represents ....

[1]

(b) Rhian decides to plant a tree.
The tree is to be planted so that it is 3 metres from the corner *A* **and** the same distance from *AB* as it is from *DC*.
Clearly mark the point where the tree should be planted on the scale drawing.

[3]

(c) Calculate the area of Rhian's lawn.

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[2]

(d) Rhian plants 250 daffodil bulbs in her lawn.
She finds that in the spring only 180 bulbs flower.

   (i) Find the percentage of the bulbs planted that flower in the spring.

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   (ii) Rhian's friend intends to plant a number of similar bulbs.
What is the probability that a bulb planted does **not** flower?

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[3]

8.

(a) A pound coin and a dice are thrown.
Find the probability of obtaining a head and a six.

[3]

(b) The dice is thrown twice.
Find the probability of throwing a three both times.

[2]

9. *(a)* A hose pipe is used to fill a bucket and a tank.
The flow of water remains the same for filling the bucket and the tank.
The bucket has a volume of 6 litres.
It takes 40 seconds to fill the bucket.
It takes 3 minutes to fill the tank.

(i) Find the volume of the tank in litres.

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(ii) Write down the volume of the tank in cm^3.

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[4]

(b) A solid metal ingot weighs 1·8 kg and has a volume of 200 cm^3. Find the density of the metal in g/cm^3.

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[3]

Turn over.