Godolphin & Latymer

Entrance Examination – Group 2

Friday 8th January 2010

MATHEMATICS

Time: 1 hour 15 minutes

Name: _____

Instructions:

Work through the paper without rushing.

Do your rough work clearly in the space near each question.

Don't rub out your working: you may get marks for it.

If you cannot answer a question, go to the next one.

NO CALCULATORS OR RULERS ARE ALLOWED

---

1. 3974
    + 258
    ———
    4232

2.   732
    − 357
    ———
    375

3. Write in numbers thirty-two thousand and twenty-seven.

32,027

4.   729
    × 7
    ———
    5103

5. $8 \overline{)34024}$ 4253
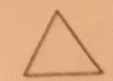
6. There is some coloured water in the jar.
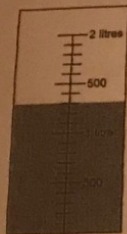
I L 300 mL

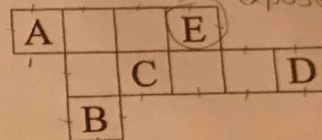How much **more** water is needed to make **2 litres**?

7.0.0. mL.

7. Fill in the gaps in these number patterns:

a) 37 _34_ 31 _28_ _25_
   −3

b) 0.8 0.4 0.2 _0.1_ _0.05_
   ÷2

c) 1 3 9 27 _81_ _243_
   ×3

8. The shape below is made up of square tiles. Which of tiles A, B, C, D or E could be removed so that the perimeter remained the same? Circle your answer.

expose → still when remove

A E
   C   D
B

9. Five bags of apples cost £3.25

How much would seven bags of apples cost?

1 bag cost £0.65

7×0.65

£4.55

10. Circle the numbers which are larger than 1/3   0.3̇ = 3/9

0.25   2/9   0.039   (4/5)   (3/8)
 <   <   <   0.8   0.375

11. Write down the number which is 21 less than 2000.

1979

12. These are the start and finish times on a DVD recorder:

START 14:48

FINISH 17:25

For how long was the video recording?

DO 14:48 - 15:00 = 12
15:00 - 17:00 = 2 hrs
17:00 - 17:25 = 2 ...... hours .7. mins
= 25 mins

13. There were 500 cats in a survey about two new cat foods, Moggy Nosh and Feline Fodder.
220 were Persians and the rest were Siamese.
80 cats preferred Moggy Nosh.

Of these, 42 were Persians.

Extra Question: how many siamese prefer feline fodder?

Use this information to complete this table.

	Persian	Siamese	total
Prefer Feline Fodder	178	242	420
Prefer Moggy Nosh	42	38	80
total	220	280	500

14. Find the missing digit to make the calculation correct:

```
    4  A
  ×    A
  ───────
  3  2  9
```

3×3 = 9 ✗
7×7 = 49 ✓

A = .7....

15. The pupils in a Mathematics class were asked which sport they enjoyed the most. The answers given are shown in the bar graph below:

| Badminton | Hockey | Horse Riding | Netball | Tennis |
| 3 | 8 | 6 | 7 | 2 |
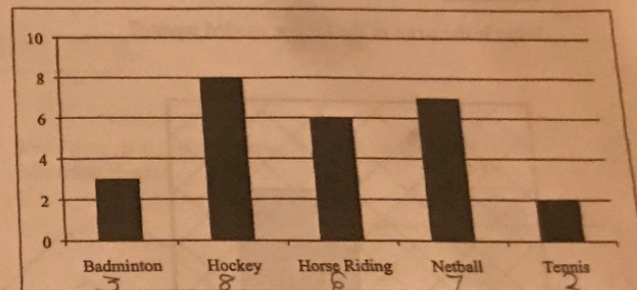
a) How many more pupils answered Netball than Badminton?

.4...........

b) Two pupils in the class were away the day the question was asked. How many pupils in total are in the class?

26+2 = 28

.28..........

16. Jenn's fish tank was filled half way. She added 9 gallons of water to the tank and found that it was then 7/8 full. How much water can the tank hold altogether?

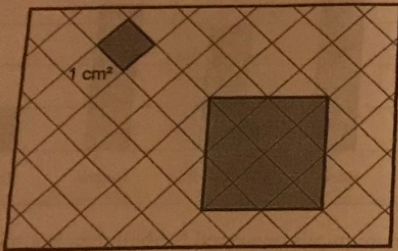$\frac{1}{2}x + 9 = \frac{7}{8}x$

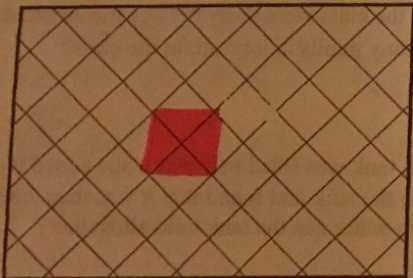$\frac{3}{8}x = 9$

$x = 24$

.24...........gallons

OR: V = L×W×H

17. The **area** of the **small shaded square** is **1 square centimetre**.

What is the **area** of the **larger shaded square**?
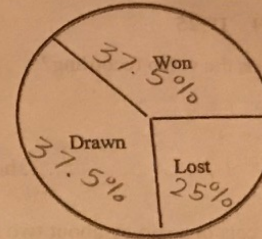
..........8..........

1 cm²

In the grid below, draw a **square** with an **area** of **2 cm²**.

18. The pie chart shows the results of the 96 games played by a school football team. They lost 25% of their games and won and drew an equal number of games.
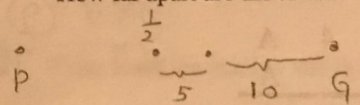

37.5% Won

Drawn 37.5%

Lost 25%

How many games were:

a) lost $\frac{1}{4}(96)$ ....24......

b) won ....36......

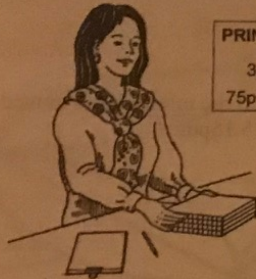$.375(96) =$

OR $\frac{96-24}{2} = \frac{72}{2} = 36$

19. Two girls were on a sponsored walk from Pangbourne to Goring.
One of them gave up 5km after she had passed the half-way check-point.
She was then 10km from Goring.
How far apart are the towns?

$\frac{1}{2}$

P   5   10   G

So this is 15   ......30 km......

20. Mrs Jones prints books.

PRINT CHARGES
3p per page
75p for the cover

Jon pays **£4.35** for his book, **including the cover.**

How many **pages** are in his book?

$4.35 - .75 = 3.60$

$\dfrac{3.60}{.03} = 120$

120
....

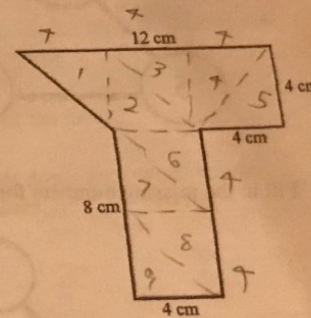**21.** This is a right angled triangular tile:

4 cm

4 cm
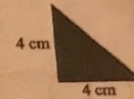
Write how many of these tiles you can fit into each of the following shapes.

4 cm

3

1 2 4

12 cm

4 cm

12 cm

1 3 5

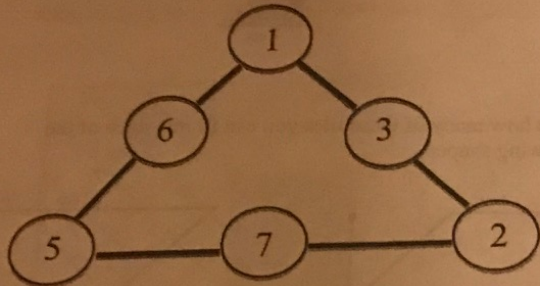2 4

6

7 8

9

4 cm

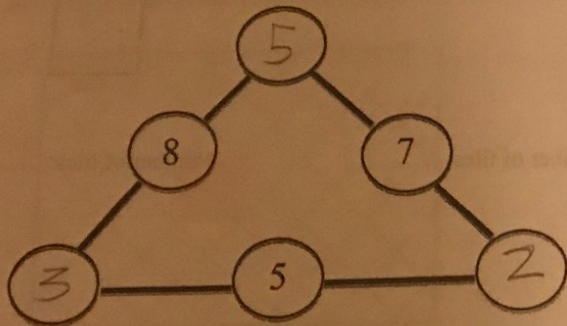4 cm

8 cm

4 cm
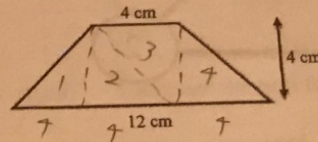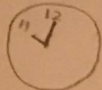
Number of tiles: 4......

Number of tiles: 9.....

22. Numbers are placed in a triangle.
The numbers in the middle of the sides are the sum of the numbers at the ends.

Fill in the missing numbers for this triangle:

23. a) Find the angle between the hands of a clock at 11am.

3.0°

$\frac{360}{12} = 30°$

$\frac{30}{5} = 6°$

so moves $6°$ per minute

b) How many degrees has the minute hand moved between 3.55pm and 5.15pm.

80 mins

$80(6) = 480$

3:55   9:15

48.0°

or

3:55 - 4 = 5 mins (30°)
4 - 5 = 1 hr (360°)
5 - 5:15 = 15 mins (90°)
30 + 360 + 90
= 480°

24. A piece of wire 36cm long is bent into the shape of a rectangle. If the rectangle is twice as long as it is wide, what is the area?

2W

[rectangle] W

12

[rectangle] 6
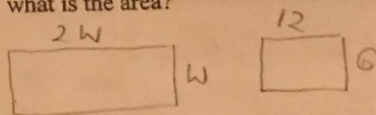
$6W = 36$
$W = 6$

72

25. A boy ate 100 cookies in five days. Each day he ate 6 more than the day before. How many cookies did he eat on the first day?

$x + (x + 6) + (x + 12) + (x + 18) + (x + 24)$
$= 100$

$5x + 60 = 100$
$5x = 40$
$x = 8$

8 cookies

26. The diagram shows the number of paths from Queton to Toytown through Rowton or Seton.

Rowton

Queton   Toytown

Seton

AND = ×
OR = +

How many different ways are there of getting from Queton to Toytown if you can only go from left to right?

$2 \times 3 + 3 \times 4$
$= 6 + 12$
$= 18$

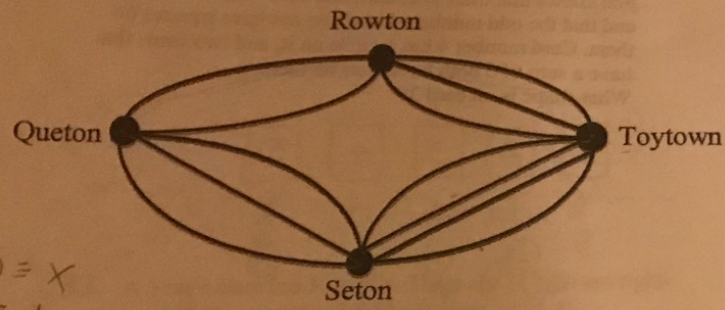18

$\underline{2 \times 3} \; (+) \; \underline{3 \times 4}$

$6 + 12$

$= 18$

27. Here is a number pattern:

A	B	C	D
	1	2	3
6	5 +4 / 7 +2	4 +2 / 8 +4	9 +6
12 +6	11 +4 / 13 +2	10 +2 / 14 +4	15 +6
18 +6	17 +4	16 +2	
even	odd	even	odd
Multiple of 6	prime		Multiple of 3

a) Complete the next two rows of the table.

b) If the pattern continued, write down the correct column letter for each of these numbers:
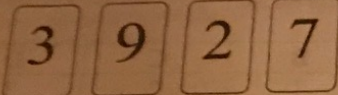
(i) 29   B

(ii) 54   A
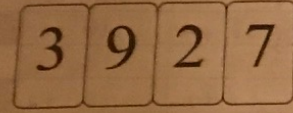Multiple of 6

(iii) 141   D
Multiple of 3

so 4 colours

14 boys

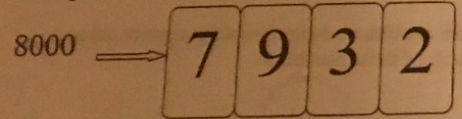**28.** Here are some number cards:

3	9	2	7

You can use each card once to make the number 3927, like this:

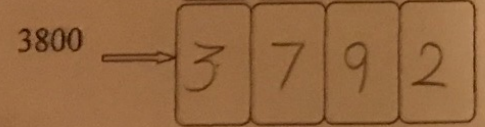| 3	9	2	7

Use the four number cards to make numbers that are as close as possible to the numbers written below.

Example

8000 → | 7 | 9 | 3 | 2 |

You must **not** use the same card more than once in each answer.

3000 → | 2 | 9 | 7 | 3 |

7000 → | 7 | 2 | 3 | 9 |

3800 → | 3 | 7 | 9 | 2 |
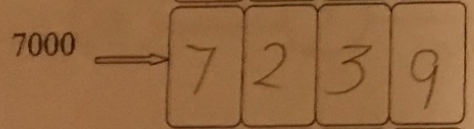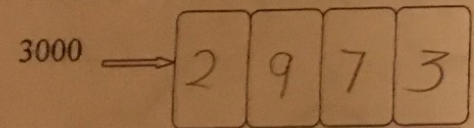
29. Jemima has five cards which are numbered from 1 to 5 on one side, and have either a square, a circle, a triangle or a star drawn on the other side.
She knows that there is at least one card with each shape and that the odd numbered cards do not have squares on them. Card number 4 has a circle on it, and two cards that have a sum of 6 both have stars on them.
What shape is on card 3?

1	2	3	4	5
☆	□	△	○	☆
③	⑤	④	①	③

last thing left)   Not □. So must be 4

△ ....
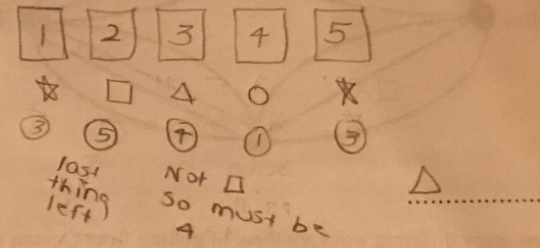
30. A number of children are standing in a circle. They are evenly spaced and the 7th child is directly opposite the 18th child. How many children are there altogether?

18 − 7 = 11

So 11 children in half the circle

11 × 2 = 22

OR: Think 10 students between 18 and 7

total number = 10+10+2 = 22
↑
for 7th and 18th   22 ....

OR:

18
12 (○) 12
7

don't count some kids again

12 + 12 − 2 = 22

31. Four years ago the combined age of 3 dogs was 24 years.
What will the combined age be in 2 years' time?

each will be 2 years older
so +6 years
24 + 6 = 30

(42)
~~30~~
....

in 6 years time
so need to
add 6(3)=18
24+18 = 42

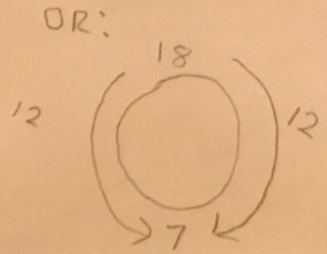**32.** A Year 6 class has 30 pupils. There are (21) who are right-
handed. There are 16 girls in the class.
Not all the girls are right-handed.
What is the smallest number of girls who are (right)
(handed?)

similar to 2011 #25 but harder since don't know x and y. In 2011 blue, but here only know girls but can work out boys

B RH
G RH

	B	G	Total
LH			
RH	*Assume all 14*	*⇒ 7 is least*	21
Total	14	(16)	30
			..7..

would be greatest if asked for it

OR: using algebra   x = girls, y = boys
x + y = 30
x = 16
⇒ y = 14   Assuming all boys RH to get smallest number of girls so 14 boys
can do ... also ... 30-16 = 14   21-14 = 7 RH girls

33. A wheel has 3 different colours painted on its rim, red
(R), green (G) and yellow (Y).
As it turns, a pattern is left on the ground.
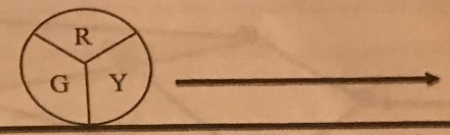
The first mark is yellow, and the second mark is red, so the
pattern left on the ground will be:

1 2 3
Y R G Y R …

a) What is the colour of the 20th mark?

R.e.d...........

Another wheel makes the pattern
1 2 3 4
G Y Y R G Y Y R G …..

b) What is the colour of the 38th mark?

Yellow....

Another wheel has 6 **different** colours. No colour is repeated.

c) If red is the 83rd colour in the pattern, how many colours
are at the start of the pattern before red occurs?
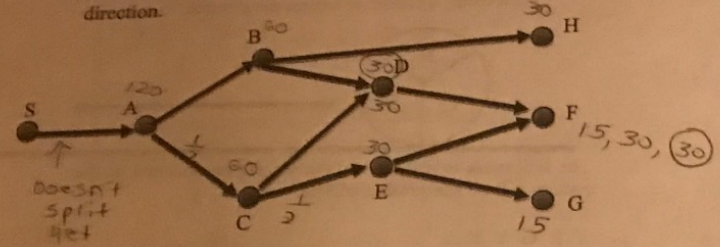
1 2 3 4 (5) 6 →R

closest is 78 that 6   4 colours
fits into
6 × 14 = 84

Or do 84 is 6th so 83rd is 5th   so 4 colours b4 that

R
↓

34. Some marbles are released through this network from S. At each of the junctions, half of the marbles flow in each direction.

(handwritten annotations on diagram: B 30, 30 D, 30, 120, A, S, ½, 60, 30, 30, F 15, 30, (30), C ½, E, G 15, H, "Doesn't split yet")

a) What fraction of the marbles go through E?

$$\frac{1}{2} \times \frac{1}{2}$$

$\frac{1}{4}$

b) If 120 marbles are released through the network, how many do not reach F?

$$120 - 75 = 45$$

45

125

(handwritten, bottom left:)
formula:
$\frac{1}{5} + \frac{1}{2} = \frac{1}{8}$
so $5 = 2^{2}$

◇   ⬠

35. It takes two decorators 8 days to paint a house. One is lazy and one is energetic. The energetic one could paint the house in 12 days on his own. How many days would it take the lazy one to paint the house on his own?

Way 1: energetic: 12 days = 1 house
1 day = $\frac{1}{12}$ house
8 days = $\frac{8}{12}$ house = $\frac{2}{3}$

So Lazy painted $\frac{1}{3}$ of the house in 8 days

$\frac{2}{3} : \frac{1}{3}$ = E : L ≡ 2 : 1

so $8 \times 3 = 24$ 24 days

Way 2: L is half as productive so if it takes 12 days for energetic it takes 24 days for lazy

36. Work out the perimeter of the following shape.

All the interior angles are right angles.
The shape is not drawn accurately.
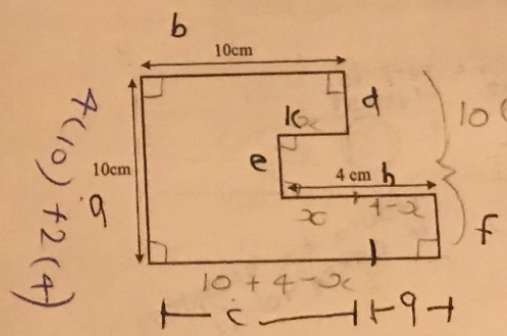
(handwritten labels on shape: b, 10cm, 10x d, e, 4 cm h, x, 4-x, f, 10cm, 10+4-x, a, 4(10)+2(4), 10 (cover same distance))

c 9

$$10 + 10 + 10 + x + \left(2 + (4 - x)\right) + (10 + 4 - x)$$
$$= 48$$

OR:
$a + b + c + d + e + f = 40$
$h = 4 \Rightarrow g + k = 4$
so $40 + 4 + 4 = 48$

$a = 10, b = 4$ $4a + 2b$
$40 + 8 = 48$

use fact that ducks weigh more
than ducklings

x ↑   ↑ y

37. Three ducks and two ducklings weigh 32kg. Four ducks and three ducklings weigh 44kg. All ducks weigh the same as each other and all ducklings weigh the same as each other.
What is the weight of two ducks and one duckling?

similar to 2013 #38

$3x + 2y = 32$ } think of factors of 32, 44
$4x + 3y = 44$ }

so $x + y = 12$ can use trial and error

or algebra:

$9x + 6y = 96$
$8x + 6y = 88$ (subtract)
$x = 8, y = 4$ $2(8) + 4 = 20$

__20 Kg__

$4 \div 2 = 2$
$6 \div 2 = 3$
$8 \div 2 = 4$
$6 \div 3 = 2$
$8 \div 4 = 2$ ✓

$1, 2, 3, 4, 5, 6, 7, 8$

38. Use each number from 1 to 8 once in the boxes to make all the calculations correct:

8	÷	4	=	2
−			×
7			3
=			=
1	+	5	=	6

Trial and error
start w/ x and ÷ ones

OR: $3x + 2y = 32$ ①
$4x + 3y = 44$ ②
so $x + y = 12$ ③
want $2x + y$

go ① − ②
⇒ $2x + y = 20$

Do first
② $× 3 = 6$
$2 × 4 = 8$

② is most common in first, in first
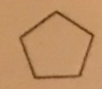
39. In a game two discs are tossed and the numbers landing uppermost are added together.
The red disc has the number 3 on one side and 5 on the other side; whereas the blue disc has 4 on one side and 7 on the other.
If they land so that 3 and 7 are showing, the score is 10. Write down the other possible scores for this game.

R: 3, 5
B: 4, 7

7 .... 9 .... 12 ....

In a new game a green disc has 6 on one side and 4 on the other. A yellow disc has 1 on one side and 3 on the other. The rules are the same. Find the score which you are **most likely** to get.

G: 6, 4
Y: 1, 3

7, 9, 5, 7

7 ....

In another game a pink disc has 8 on one side, but on the other side is a mystery number, and a purple disc has 4 on one side with a different mystery number on the back. The four possible total scores are 12, 13, 14, 15. Find two possible pairs of values for the mystery numbers.

pink: 8, ?
Purple: 4, ?

pink 10 ....   OR   pink 9 ....

purple 5 ....   purple 6 ....

Pink: 8, x
Purple: 4, y

$8 + 4 = 12$
$8 + y = 13 ⇒ y = 5$
$x + 4 = 14$
$x + y = 15 ⇒ x = 10$

OR
$8 + 4 = 12$
$8 + y = 14 ⇒ y = 6$
$x + 4 = 13 ⇒ x = 9$
$x + y = 15$

40. Each of the symbols has a different value associated with it. When you add up the value of all the symbols you get the total value for that row or column. Find the value of each symbol.

Similar to 2013 #31

	1	2	3	4	
a	♥	▲	☺	▲	99
b	☺	▲	▲	♥	99
c	♥	☺	♥	☺	154
d	▲	♥	☺	▲	99
	142	99	?	99	451

(111)

C: $2H + 2S = 154$
$H + S = 77$

2: $S + H + 2T = 99$
or b
or a
So $2T = 99 - 77$
$2T = 22$
$\boxed{T = 11}$

1: $2H + S + T = 142$
So $H + H + S + T = 142$
$77 + S + 11 = 142$
So $\boxed{S = 54}$

♥ $= 54$ ▲ $= 11$ ☺ $= 23$? $= 111$

Use $H + S = 77$
to get H
$77 - 54 = 23$

① $\boxed{H + 2T + S = 99}$
② $\boxed{2H + S + T = 142}$
③ $\boxed{2H + 2S = 154}$
④ $\boxed{H + T + 2S = 111}$
⑤ ($5H + 5S + 6T = 451$) to go from ① to ④
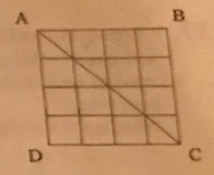① ∝ ④ ⇒ $-T + S = 12$ (ie^ taken away a T but added an S)
② ∝ ③ ⇒ $S - T = 12$
① ∝ ② ⇒ $H - T = 43$
② ∝ ④ ⇒ $H - S = 31$

41. A square grid is separated into 16 small squares.

How many ways can two squares be shaded so that the grid has symmetry about the diagonal line AC if

a) the two squares must **not** include the diagonal line?
6 possibilities for 1st square, so once chosen that, the other is fixed by symmetry

6

b) the two squares must include the diagonal line?
If 1 of the squares is on the diagonal the other must be too to obtain symmetry, so question becomes now how many ways can be choose 2 squares out of 4?
$4c_2 = 6$

6

On the grids below, show all the ways exactly two squares can be shaded so that the grid has symmetry about the two diagonal lines, AC and BD.
(You may not need to use all the grids.)
$y = x, y = -x$

42. On the planet Arithmetica, the natives have a special sort of arithmetic using the symbol $\veebar$.

For example, $5 \veebar 3$ means double 5 then subtract 3.

So $5 \veebar 3 = 2 \times 5 - 3$
$= 10 - 3$
$= 7$

(i) Work out $8 \veebar 6$

$2 \times 8 - 6$
$= 10$

.... 10

They also use this symbol twice:

For example $(5 \veebar 3) \veebar 2 = (2 \times 5 - 3) \veebar 2$
$= 7 \veebar 2$
$= 2 \times 7 - 2$
$= 14 - 2$
$= 12$

(ii) Work out $(9 \veebar 4) \veebar 3$

$2 \times 9 - 4$
$= 14$
$2 \times 14 - 3 = 25$

.... 25

(iii) If $(6 \veebar n) \veebar 10 = 8$, what is the number n ?

$12 - n$

$2(12 - n) - 10 = 8$
$24 - 2n - 10 = 8$
$2n = 6$
$n = 3$

.... 3