

City of London School for Girls

YEAR 7 ENTRANCE EXAMINATION

MATHEMATICS

SAMPLE Paper

Time Allowed: 1 hour 15 minutes

First Name:

Surname:

Instructions:

- Do write in pencil
- Do try as many questions as you can
- If you cannot answer a question, go on to the next one
- Do write your working out in the space near each question
- Do not erase your working out as you may get marks for it
- Calculators and rulers are NOT allowed

- You will be given 35 minutes to complete section A.
You will hand in section A before being given section B.
You will then have 40 minutes to complete section B.

SECTION A

35 minutes

1) $3078 + 256$

$$\begin{array}{r} 3078 \\ + 256 \\ \hline 3334 \end{array}$$

Answer: 3334

2) $3078 - 256$

$$\begin{array}{r} 3078 \\ - 256 \\ \hline 2822 \end{array}$$

Answer: 2822

3) 158×23

$$\begin{array}{r} 158 \\ \times 23 \\ \hline 474 \\ 3160 \\ \hline 3634 \end{array}$$

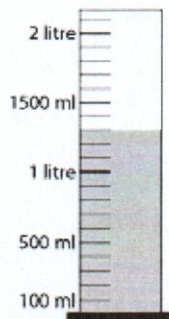
Answer: 3634

4) $3072 \div 12$

$$\begin{array}{r} 256 \\ 12 \overline{) 3072} \\ \underline{24} \downarrow \\ 67 \downarrow \\ 60 \downarrow \\ 72 \downarrow \\ 72 \downarrow \\ \hline 0 \end{array}$$

Answer: 256

5) What is the reading on the measuring cylinder



Answer: 1300 ml

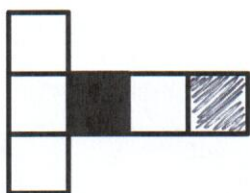
- 6) What number is twelve less than eight thousand two hundred and seven?

$$\begin{array}{r} 8207 \\ - 12 \\ \hline 8195 \end{array}$$

Answer:8195.....

- 7) Both of these nets fold to make a cube.

Shade the square that will be opposite the black square when the net is folded into a cube.



- 8) Work out the value of:

a. $3 \times 7 + 4$

$$\begin{array}{l} 3 \times 7 = 21 \\ 21 + 4 = 25 \end{array}$$

Answer:25.....

b. $12 \div 6 \div 2$

$$\begin{array}{l} 12 \div 6 = 2 \\ 2 \div 2 = 1 \end{array}$$

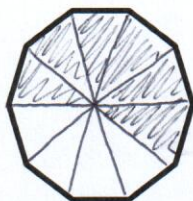
Answer:1.....

c. $15 - 4 \times 2$

$$\begin{array}{l} 4 \times 2 = 8 \\ 15 - 8 = 7 \end{array}$$

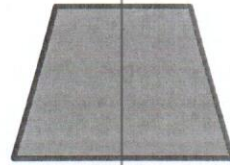
Answer:7.....

- 9) Shade in $\frac{3}{5}$ of this shape



10 sides
so $\frac{3}{5} = \frac{6}{10}$

10) Write down the mathematical name for each of these 2D shapes:



Answers: Parallelogram Pentagon Trapezium

11) Here is a table showing how many minutes four children took to get to school last week

	Maxine	Ava	Ellie	Sara
Monday	23	14	12	19
Tuesday	24	17	15	25
Wednesday	31	11 B	18	41 A
Thursday	26	16	12	22
Friday	19	16	16	23

a. Who took over 40 minutes to get to school?

Answer: Sara

b. Which person has the shortest journey to school on any day?

Answer: Ava

c. On Thursday, what is the range of the times?

Range = biggest - smallest
 $26 - 12 = 14$

Answer: 14

12) Round 12.05 to:

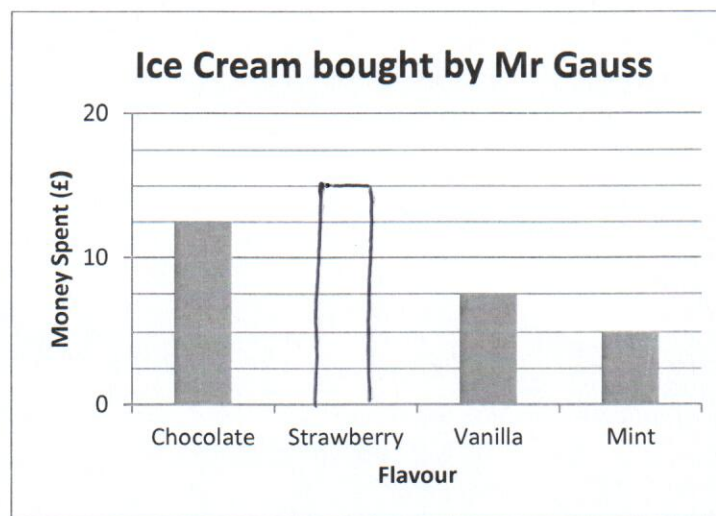
a. The nearest whole number

Answer: 12

b. To 1 decimal place

Answer: 12.1

13) Here is a bar chart.



The bar for strawberry is missing! Mr Gauss spent £15 on Strawberry ice cream.

a. Draw a bar to show how much Mr Gauss spent on Strawberry ice cream.

b. How much did Mr Gauss spend on Vanilla Ice Cream?

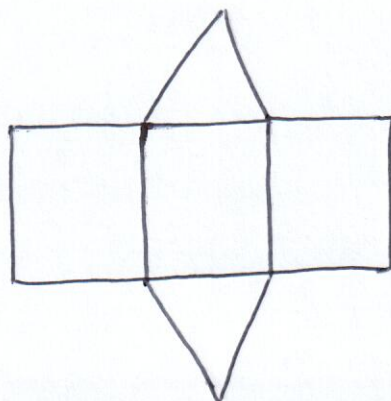
Each increment = £2.50

Answer: *£7.50*

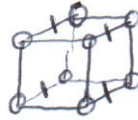
14) Fill in the next two values in this sequence:

$1\frac{3}{4}, 2\frac{1}{2}, 3\frac{1}{4}, \underline{4}, \underline{4\frac{3}{4}}, \dots$

15) Draw a net of a triangular prism



16) How many edges does a cube have?



4 front
4 back
4 edges on middle

Answer: 12

17) Which of the following is the best estimate for the length of a bus?

0.2km

2m

20cm

20 000mm

0.2m

2000cm

20m

Answer: 20,000mm

18) Reflect the grey shape in the dashed mirror line.



19) The temperature in Inverness is 12 degrees lower than the temperature in London.

The temperature in London is 5 degrees.

What is the temperature in Inverness?

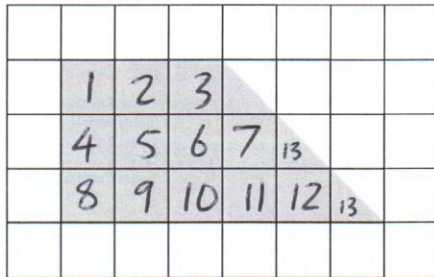
15 \rightarrow 0 = 5 degrees

0 \rightarrow -7 = 7 degrees

$$12 - 5 = 7$$

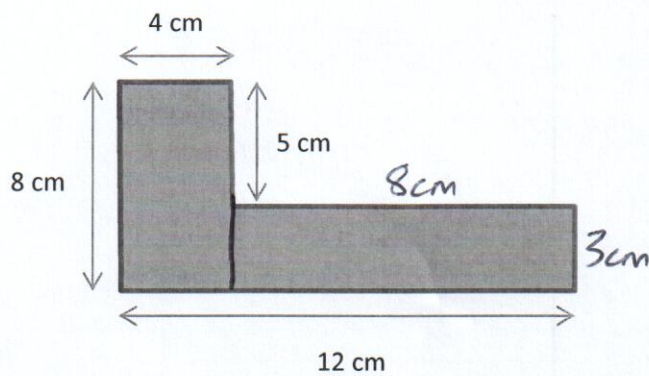
Answer: -7°C

20) Find the areas of the following shapes:



1 square = 1 cm^2

Answer:13.5..... cm^2



Not drawn to scale

$$\begin{aligned} 3 \times 8 &= 24 \\ 4 \times 8 &= 32 \end{aligned}$$

$$\begin{array}{r} + 24 \\ 32 \\ \hline 66 \end{array}$$

Answer:66..... cm^2

- 21) Max has more than 4 apples but fewer than 7 apples. Alex has more than 5 apples and fewer than eight apples.

How many apples do Max and Alex have *altogether*? Circle all the possible values

4 5 6 7 8 9 10 11 12 13 14 15

$$\begin{array}{l} \text{Alex has 6 or 7} \\ \text{Max has 5 or 6} \end{array} \quad \begin{array}{l} 5 + 6 = 11 \\ 5 + 7 = 12 \\ 6 + 6 = 12 \\ 6 + 7 = 13 \end{array}$$

Answer: 11, 12, 13

- 22) Suki saves £12 in January, £18 in February and £5 in March.

What is her mean (average) monthly saving?

$$12 + 18 + 5 = 35$$

$$\begin{array}{r} 11.66 \\ 3 \overline{) 35.00} \\ \underline{3} \\ 0 \\ \underline{0} \\ 0 \\ \underline{0} \\ 0 \end{array}$$

Answer: £ 11.66

- 23) What is $\frac{1}{2}$ of $\frac{4}{5}$ of 35?

$$\frac{4}{5} \text{ of } 35 \rightarrow 35 \div 5 = 7, \quad 7 \times 4 = 28$$

$$= 28$$

$$\frac{1}{2} \text{ of } 28 \rightarrow 28 \div 2 = 14$$

Answer: 14

- 24) Put the following numbers in order from smallest to largest:

$$\frac{3}{5} \\ 0.6$$

$$0.58 \\ 0.58$$

$$\frac{5}{8} \\ 0.625$$

$$62\% \\ 0.62$$

$$0.508 \\ 0.508$$

Answer: 0.508, 0.58, $\frac{3}{5}$, 62%, $\frac{5}{8}$

25) You are told that $82 \times 107 = 8774$

Use this to work out the value of the following:

a. 8200×107

= 100 times bigger

$$\begin{aligned} &\rightarrow 8774 \times 100 \\ &= 877400 \end{aligned}$$

Answer: 877,400

b. $8774 \div 107$

changing order of sum

if $82 \times 107 = 8774$
 $8774 \div 107 = 82$

Answer: 82

c. $8774 \div 41$

$$41 = 82 \div 2$$

$$8774 \div 82 = 107$$

$$\begin{aligned} 8774 \div 41 &= 107 \times 2 \\ &= 214 \end{aligned}$$

Answer: 214

d. A bus can seat 82 people.

8770 people travel to a football match by bus.

How many buses are needed?

107 buses can take 8774 people
only 8770 needed, but still
need all 107 buses

Answer: 107

SECTION B

40 minutes

Remember to show your working out!

1) Work out the number from the following clues:

- a. It is a whole number
- b. It is less than 100
- c. It is a square number
- d. It is one less than a multiple of 5.
- e. 16 is a factor of this number.

16

32

48

64 ← square, 1 less than multiple of 5, <100, whole

Answer: 64

2) $B + A + T = 17$ ①

$C + A + T = 25$ ②

$C + O + A + T = 29$ ③

What is the value of $B + O + A + T$?

③ - ②

$\Rightarrow O = 4$

② - ① = 8

so difference between
B and C = 8

(C is 8 more than B)

$B + A + T = 17$

if $O = 4$

$B + O + A + T = 17 + 4$
 $= 21$

Answer: 21

- 3) A rectangle is 6cm longer than it is wide. Its perimeter is 32cm. Find its area.

$$x = \text{width}$$

$$2x = \text{length}$$

$$\text{perimeter} = x + 2x + x + 2x + 12$$

$$32 = 4x + 12$$

$$20 = 4x$$

$$5 = x$$

$$\text{area} = 11 \times 5$$

$$= 55 \text{ cm}^2$$

$$\text{width} = 5 \text{ cm}$$

$$\begin{aligned} \text{length} &= 5 + 6 \text{ cm} \\ &= 11 \text{ cm} \end{aligned}$$

Answer: 55 cm^2

- 4) On Planet Pythagoras, the people use a different money system to us.

One pog is worth four pings

Three pings are worth five paz



Convert the following:

A. 3 pog = 12 pings $4 \times 3 = 12$

B. 40 paz = 6 pog

C. 3 paz = 0.45 pog

$$5 \text{ paz} = 3 \text{ pings}$$

$$40 \text{ paz} = 24 \text{ pings}$$

$$24 \text{ pings} = 6 \text{ pogs}$$

$$4 \text{ pings} = 1 \text{ pog}$$

$$40 \text{ paz} \rightarrow 3 \text{ paz}$$

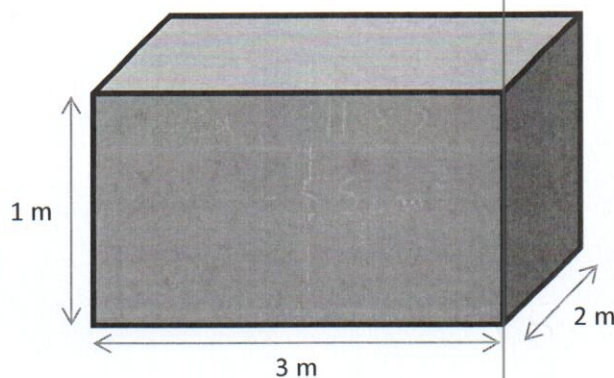
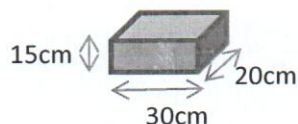
$$\div 10$$

$$4 \text{ paz} = 0.6 \text{ pog}$$

$$3 \text{ paz} = 0.45 \text{ pog}$$

- 5) What is the largest number of 15cm by 30cm by 20 cm shoe boxes that can fit in a 1m x 3m x 2m crate?

Be careful – you can't chop up the shoe boxes!



$$100 \times 300 = 30000$$

$$30000 \times 200 = 6000000 \text{ (area crate)}$$

$$15 \times 30 = 450$$

$$450 \times 20 = 9000$$

$$6000000 \div 9000$$

$$600 \div 9$$

$$\begin{array}{r} 66 \\ 9 \overline{) 600.00} \\ \underline{54} \\ 60 \\ \underline{54} \\ 6 \text{ rem } 6 \end{array}$$

checking

$$\begin{array}{r} 66 \\ \times 9 \\ \hline 594 \end{array}$$

Answer: 66

6) Miss Lovelace writes the following pattern on the whiteboard:

$$\begin{aligned} 6 \times 6 &= 36 \\ 5 \times 7 &= 35 = 36 - 1 \\ 4 \times 8 &= 32 = 36 - 4 \\ 3 \times 9 &= 27 = 36 - 9 \end{aligned}$$

a. Write down the next line of the pattern

$$\dots 2 \times 10 = 20 \dots = 36 - \dots 16 \dots$$

Miss Lovelace says this works for other starting numbers as well and writes a second pattern

$$\begin{aligned} 15 \times 15 &= 225 \\ 14 \times 16 &= 224 = 225 - 1 \\ 13 \times 17 &= 221 = 225 - 4 \\ \begin{array}{rcl} 12 & 13 & = \\ 11 & 14 & - 9 \\ 10 & 15 & - 16 \\ & & - 25 \end{array} \end{aligned}$$

$$\begin{array}{r} 21 \\ 9 \\ \hline 189 \end{array}$$

b. Complete the following line of the pattern

$$9 \times \dots 21 \dots = \dots 189 \dots = 225 - \dots 36 \dots$$

c. You are told that $137^2 = 18769$

Use this fact and the idea above to work out the value of 133×141 .

(Note: Do not multiply 133 by 141)

$$\begin{aligned} 137 \times 137 &= 18769 \\ 138 \times 138 &= 18769 - 1 \\ 135 \times 139 &= 18769 - 4 \\ 134 \times 140 &= 18769 - 9 \\ 133 \times 141 &= 18769 - 16 \end{aligned}$$

$$18769 - 16$$

Answer: $\dots 18753 \dots$

- 7) Amy, Bella and Cara have twenty sweets altogether.

Amy says she has ten of the sweets.

Bella says that Cara has one more sweet than Amy.

Cara says that she has the most sweets

$$\begin{aligned} A &= 10 \\ B \rightarrow C &= A + 1 \end{aligned}$$

Exactly one of them is lying.

Who is lying? Explain briefly how you know.

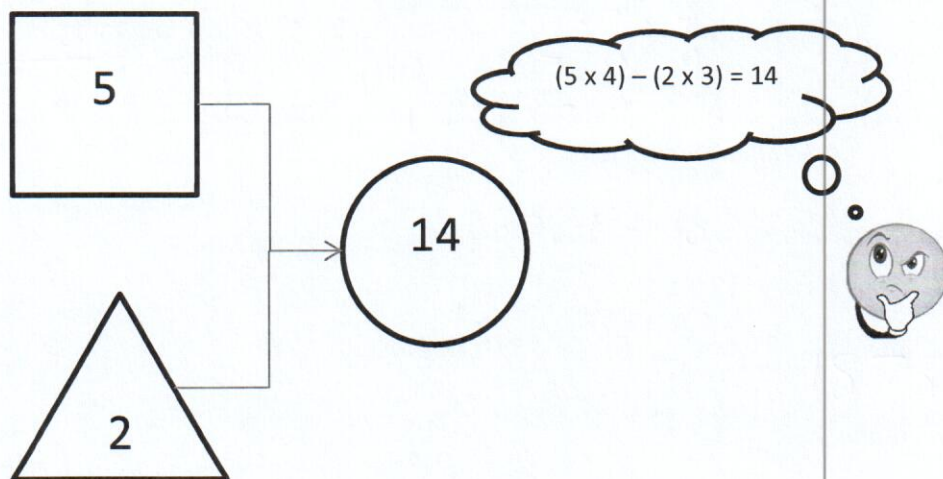
Answer: Amy

If Amy is correct, then, using Bella's statement, Cara must have 11 (max 20 so false) and using Cara's statement, she's correct but total would have to be more than 20.

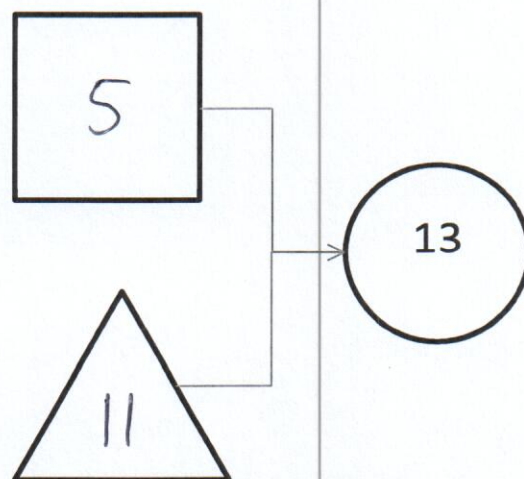
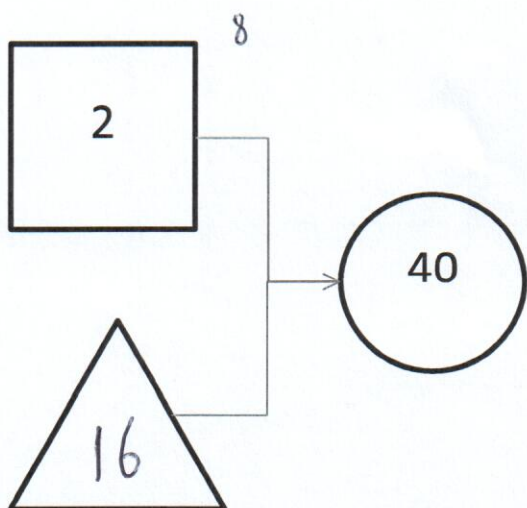
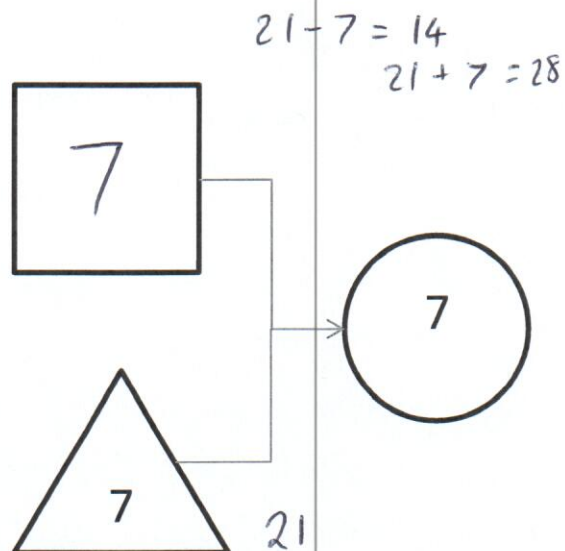
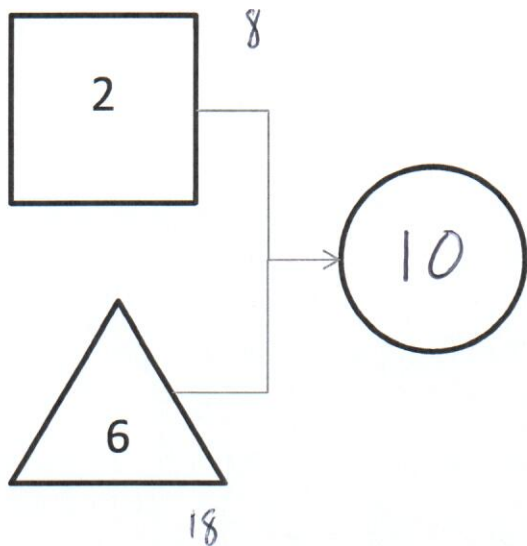
- 8) The numbers in the following shapes must follow the rule:

To find the number in the circle, multiply the number in the triangle by 3, multiply the number in the square by 4 and find the difference

Example:



Work out the missing values:



$$40 + 8 = 48$$

$$48 \div 3 = 16$$

4
8
12
16
20
24
28

3
6
9
12
15
18
21
24
27
30
33
36
39
42

- 9) A theme park wants to make more money. The director thinks that if she **reduces the ticket price by one-third**, the **number of people** who come to the theme park will **double**.

- a. In 2016, the park made £360 from ticket sales. Tickets were £4.50.
How much money does the director think the theme park will make in 2017?

$$\begin{aligned}
 &360 \\
 &\div 4.50 \times 2 = \pounds 9 \\
 &360 \div 9 = 40 \\
 &\text{so } 80 \text{ people visited}
 \end{aligned}$$

director thinks visitors will double, so 160
 $160 \times \pounds 3$ (red. ticket price)

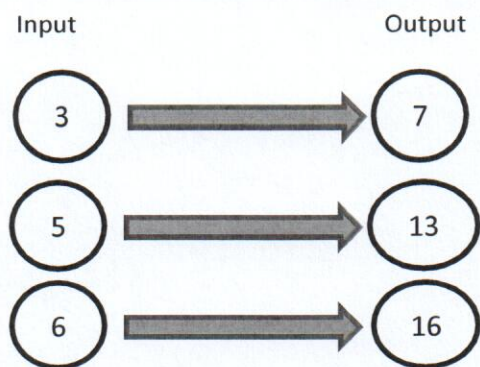
Answer: £480

- b. In fact, the theme park makes £390. How many more people went to the theme park in 2017 compared to 2016?

$$\begin{aligned}
 &\pounds 4.50 \text{ reduced by } \frac{1}{3} = \div 3 \times 2 = \pounds 3 \text{ per ticket} \\
 &3 \overline{) 390} \\
 &\quad 130 \\
 &\quad \text{130 people}
 \end{aligned}$$

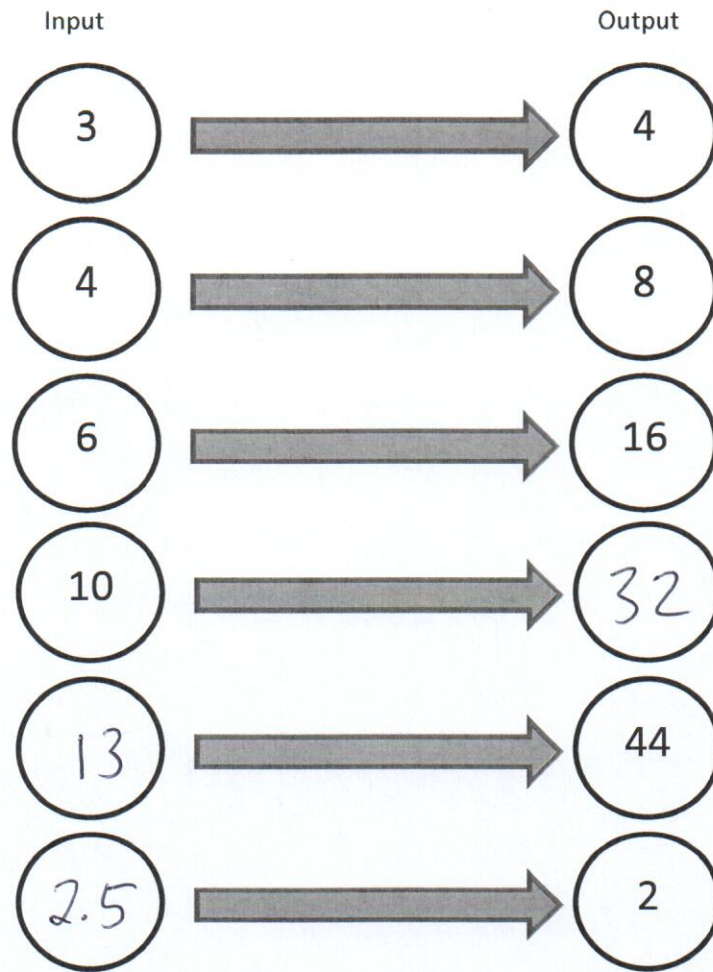
Answer: 30 people less
 160 in 2016
~~160~~
 130 in 2017

- 10) Here is an example of a function machine:



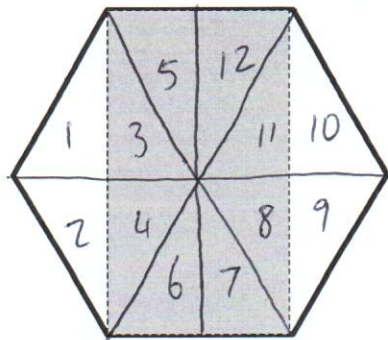
Rule: Multiply by three, then subtract 2.

Fill in the gaps in this new function machine:



Rule: - 2 then multiply by 4

11) This diagram shows a regular hexagon.



12 triangles
8 shaded

$$\frac{8}{12} = \frac{2}{3}$$

What fraction of the hexagon is shaded?

$$\frac{2}{3}$$