#31

Name .....

Present School .....

The London Independent Girls' Schools Consortium

Group 1

Mathematics Entrance Examination

9th January 2009

Time allowed: **1 hour 15 minutes**

Write in pencil.

Do all your rough working in the space near the question. Do not rub it out.

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

CALCULATORS AND RULERS ARE NOT ALLOWED.

1.
$$\begin{array}{r} 24153 \\ +\ \ 3274 \\ \hline 27427 \end{array} = 27427$$

2.
$$\begin{array}{r} 5137 \\ \times\ \ \ \ 8 \\ \hline 41096 \end{array} = 41096$$

3. $4\overline{)3256} = 814$

4. Find the difference between 2.7 metres and 32 centimetres.

Give your answer in metres.

$32\,cm = \frac{32}{100}\,m$

$= 0.32\,m$

$\Rightarrow 2.70$

0.32

$2.38\,m$

Answer: 2.38 m

5. What fraction of a minute is 40 seconds?

$1\,min = 60\,Sec$

$\Rightarrow \frac{40}{60} = \frac{4}{6} = \frac{2}{3}$

Answer: 2/3

6. Put the following fractions in order, starting with the smallest.

$\frac{2}{3}, \frac{3}{5}, \frac{29}{45}$

$\frac{2}{3} = \frac{2\times15}{3\times15} = \frac{30}{45} > \frac{29}{45}$

$\frac{3}{5} = \frac{3\times9}{5\times9} = \frac{27}{45} < \frac{29}{45}$

Answer: $\frac{3}{5}, \frac{29}{45}, \frac{2}{3}$

7. Which is the smallest number?

0.54 0.092 0.635 0.3

Answer: 0.092

8. Which number between 55 and 65 can be divided exactly by 9?

$9 \times 6 = 54$

$9 \times 7 = 63$

$9 \times 8 = 72$

Answer: 63

9. Which number between 140 and 170 can be divided exactly by both 8 and 9?

=> The number should be divisible by L.C.M of 8 and 9

L.C.M = 72

=> $72 \times 2 = 144$

$72 \times 3 = 216$

Answer: 144

10. Add together the following numbers and write your answer in figures.

nine million eleven thousand twelve hundred thirteen

$9,000,000 + 11,000 + 1200 + 13$

$= 9012213$

Answer: 9012213

11. The diagram shows the distances between some cities.

If the total distance travelled from Lisbon to Munich is 2730 km, how far was the journey from Madrid to Paris?

$\Rightarrow 638 + x + 827 = 2730$

$\Rightarrow (1465 + x) = 2730$

$\Rightarrow x = 2730 - 1475 = 1265$ km

Answer: 1265 km

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12. Sonal wishes to buy a magazine priced at £2.28.

a. What is the least number of coins she could use to reach the exact price?

£2 + 20P + 5P + 2P + 1P
= £2.28

Answer: 5 Coins

b. Miriam pays for two of these magazines with a £10 note. How much change should she receive?

Change = 10 − (2 × 2.28)
= 10 − 4.56
= £5.44

Answer: £ 5.44

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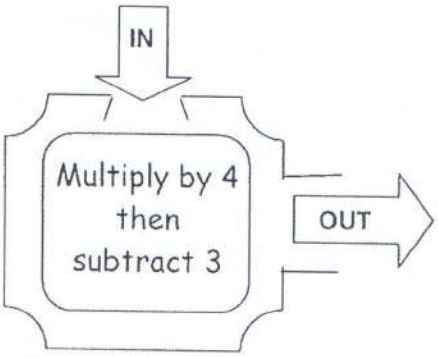
13. a. Complete the table of values for this number machine with the rule 'multiply by 4, then subtract 3'.



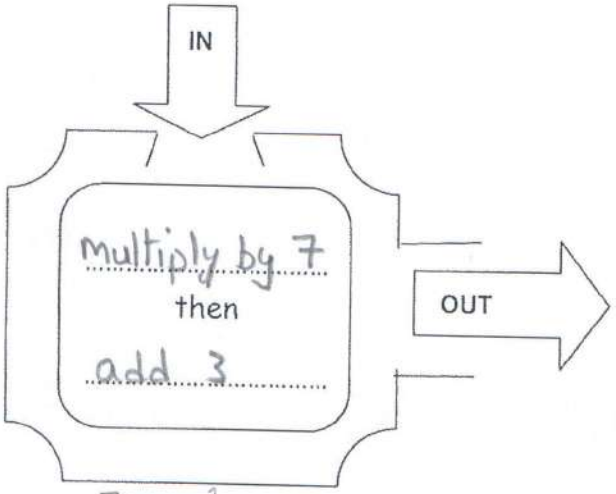
Number IN	Number OUT
7	25
2	5
10	37
21	81

$(10 \times 4) - 3 = 37$

$4x - 3 = 81$

$\Rightarrow 4x = 84 \Rightarrow x = 21$

b. What is the rule for this number machine? Write your answer inside the machine.



Number IN	Number OUT
2	17
7	52
9	66
10	73

$2\overline{)17}$ → 7, 14, 3 $\quad 7\overline{)52}$ → 7, 49, 3 $\quad 10\overline{)73}$ → 7, 70, 3

14. On her birthday last year, Emily was 140cm tall. When she measured herself on her birthday today, she calculated that she had grown by a fifth of the height she was a year ago.

a. How tall is she now?

Height increased $= \frac{1}{5} \times 140$

$= 28$ cm

$\Rightarrow$ New height $= 140 + 28$

$= 168$ cm

Answer: 168 cm

b. Emily's brother, Jack, is now 105cm tall, having grown by one sixth of his height a year ago. How tall was Jack one year ago?

Let 'H' be the height of Jack 1 year ago

$H + (\frac{1}{6} \times H) = 105$

$\Rightarrow H + \frac{H}{6} = 105$

$\Rightarrow 7H/6 = 105$

$\Rightarrow H = \frac{105 \times 6}{7} = 90$ cm

Answer: 90 cm

15. 32 students and 4 members of staff from Encrypt School are going to a lecture on code-breaking.

Code-Breaking Lecture
Ticket Prices
Students: £14.00 each Adults: £15.00 each
1 free adult ticket provided with every 10 student tickets purchased

How much will the tickets cost in total for the school party?

Ticket cost for students = (32 x 14)
No of free Adult tickets = 3 = £ 448
Cost of adult tickets = 1 x 15 = £15 Answer: £ 463
Total = (448 x 15) = £ 463

16. The scale is measured in degrees Celsius, °C.

a. What temperature does the thermometer show?

Answer: 23 °C

Each division = 2°C
Reading is exactly in the middle of 22°C & 24°C

b. What temperature does this thermometer show?

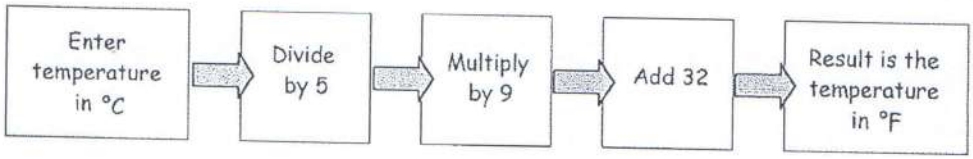
Answer: -12 °C

c. What is the difference between these two temperatures in °C?

Difference = 23 − (−12)
= 35°C

Answer: 35 °C

d. A flow chart for converting °C into degrees Fahrenheit, °F, is



i. What temperature is 20 °C in °F?

① $\frac{20}{5} = 4$, ② $4 \times 9 = 36$, ③ $36 + 32 = 68$

in short

$20 \times (\frac{9}{5}) + 32 = 68°F$

Answer: 68 °F

ii. What temperature is 59 °F in °C?

$\frac{9x}{5} + 32 = 59$

$\Rightarrow \frac{9x}{5} = 27$

$\Rightarrow x = \frac{27 \times 5}{9} \Rightarrow x = 15°C$

Answer: 15 °C

17. The time in Athens is two hours ahead of the time in London. For example when it is 15:00 in London it is 17:00 in Athens.

a. Nani flies directly to Athens from London, departing at 08:20 hours. If the journey from London takes 3 hours 45 minutes, at what time, local to Athens, will Nani arrive in Athens?

08:20 + 3h 45 = 12:05 (London time)

=> Athens = 12:05 + 2h

= 14:05

Answer: 14:05

b. It takes the same time to fly from Athens to London as it takes from London to Athens.

Nani leaves Athens airport at 19:15 hours.

At what time will she reach London (local time)?

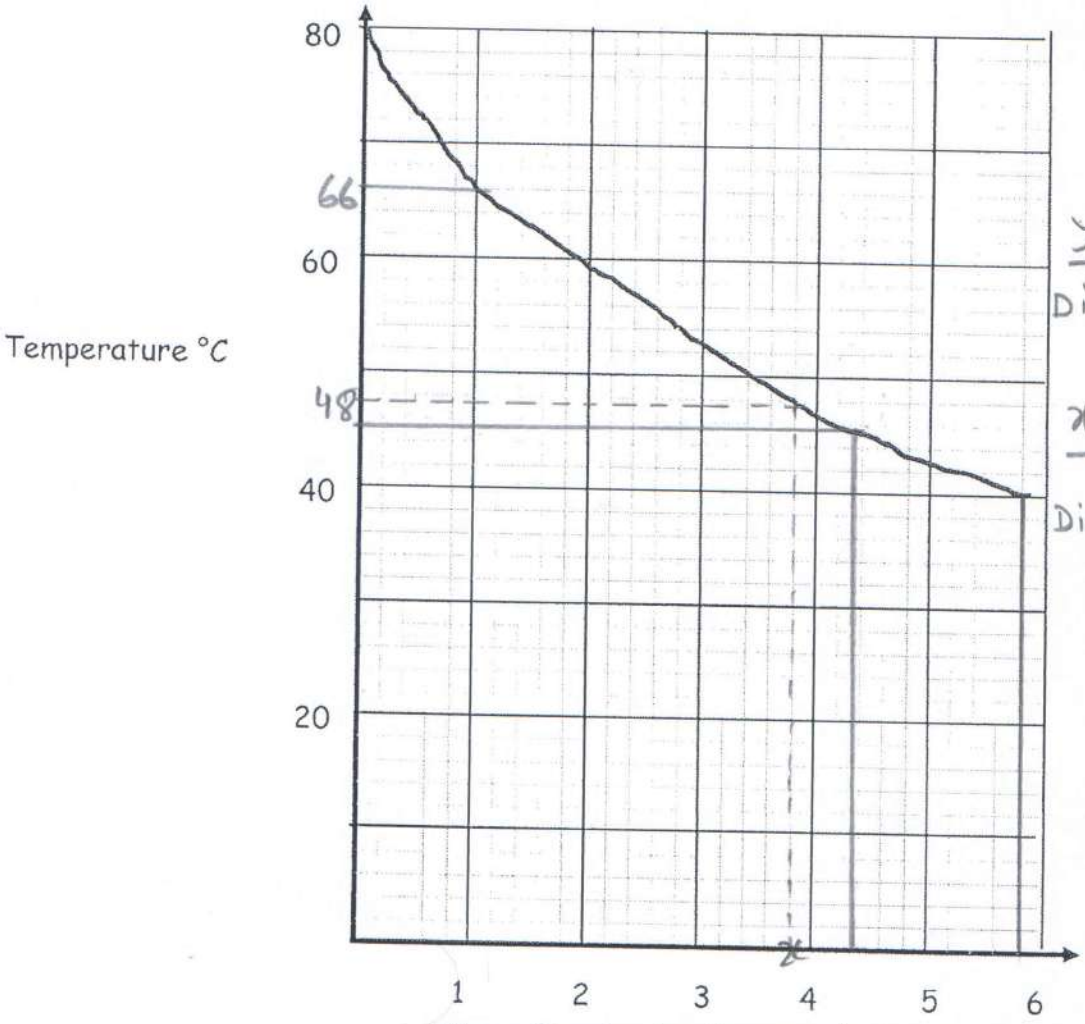
19:15 + 3h 45m = 23:00 (Athens time)

=> London time = 23:00 − 2h

= 21:00

Answer: 21:00

18. The graph shows how a freshly made cup of tea cools over time.



a. What is the temperature of the tea 1 minute after it has been made?

Answer: ..66.. °C

b. After how many minutes and seconds has the tea's temperature cooled to 45°C?

4m + (2x12)S = 4m 24S

Answer: ..4.. mins ..24.. secs

c. How long does it take for the tea to halve its original temperature? Give your answer in minutes and seconds.

$5m + (4 \times 12)s = 5m\ 48s$

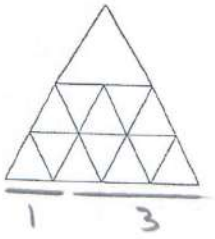
Answer: 5 mins 48 secs

d. What is the temperature of the tea 3 minutes 48 seconds after it was made?

$40 + (2 \times 4) = 48°C$

Answer: 48 °C

19. How many triangles are there in this diagram?



2 units
4 units

12 (unit sided)
+5 (2 unit sided)
+1 (3 unit)
+1 (4 unit)
19

Answer: 19

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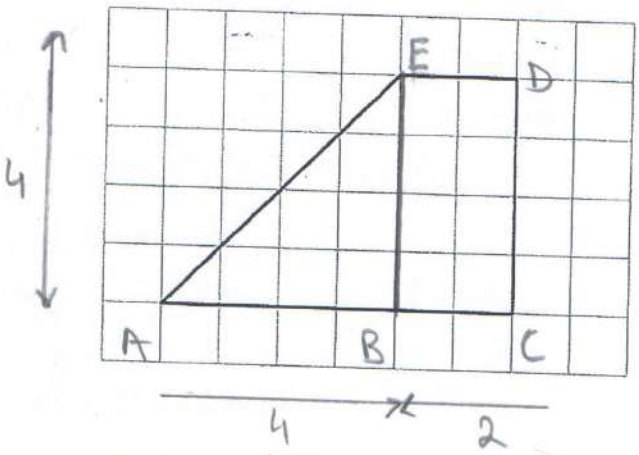
20. What is the area of this shape?



(ABCDE) = (ABE) + (BCDE)

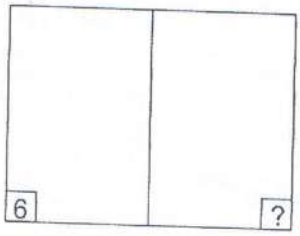
$ABE = \frac{1}{2} \times 4 \times 4 = 8 \text{ units}^2$

$BCDE = 4 \times 2 = 8 \text{ units}^2$

=> Area of Shape = 8 + 8 = 16 units²

Answer: 16 units²

21.



This is a loose sheet from a newspaper with 64 pages. What is the missing page number?

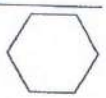
Sum of two pages = 65

$\Rightarrow 6 + x = 65$

$\Rightarrow x = 65 - 6$

$= 59$

Answer: 59



22.

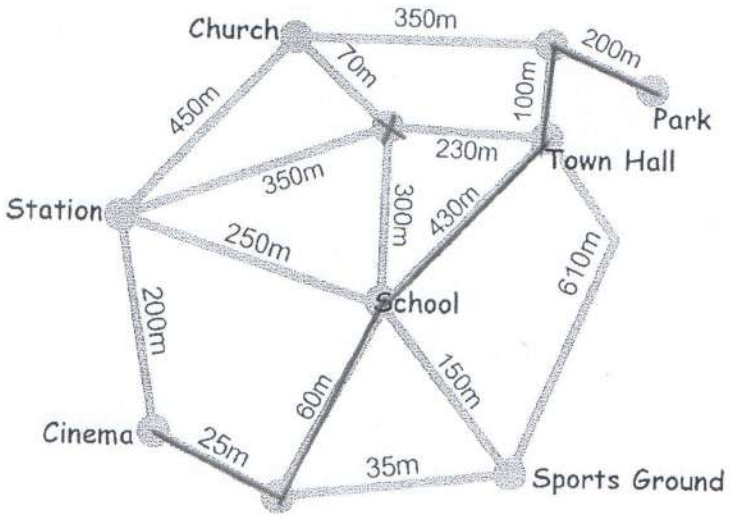
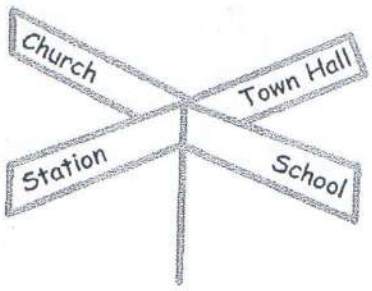


Diagram not drawn to scale.

a. Put a cross on the map where this signpost should go.



b. Using the map above what is the shortest route from the park to the cinema?

Shortest Route

$= (200 + 100 + 430 + 60 + 25)\text{m}$

$= 815\text{m}$

Answer: 815 m

23. It takes me half an hour to fill the paddling pool to a depth of 20cm using one hose.

a. How long will it take to fill it to the same depth if I use two hoses?

30 min with one hose

=> with 2 hoses $= \frac{30}{2} = 15$ min

Answer: 15 min

b. How long will it take to fill it to a depth of 30cm if I use 3 hoses?

To fill 20 cm $= \frac{30}{3} = 10$ min

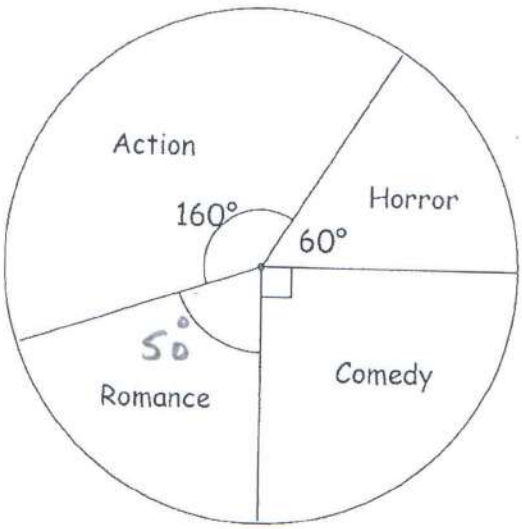
To fill 30 cm $= x$

=> $x \times 20 = 30 \times 10$

=> $x = \frac{30 \times 10}{20} = 15$ min

Answer: 15 min

24. 72 pupils were asked to choose their favourite type of film. The results are shown in the diagram.



a. How many pupils chose Comedy?

$\frac{90}{360} \times 72 = \frac{72}{4} = 18$

Answer: 18

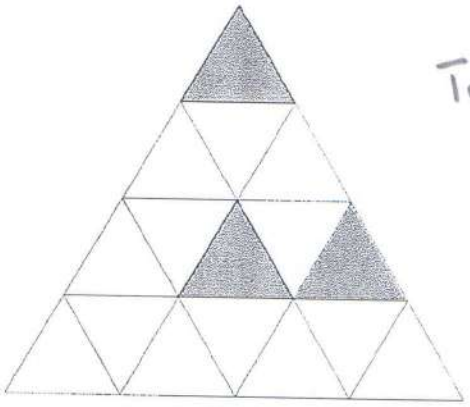
b. What angle should be in the sector representing Romance?

$360 - [90 + 60 + 160] = 360 - 310$

$= 50^\circ$

Answer: 50°

25. What fraction of this diagram is shaded?



Total small triangles

$= 1+3+5+7$

$= 16$

Answer: 3/16

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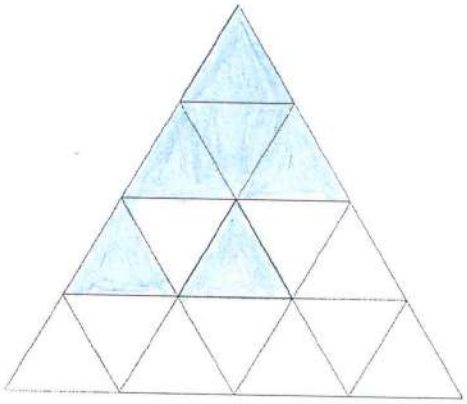
26. Shade $\frac{3}{8}$ of this diagram.

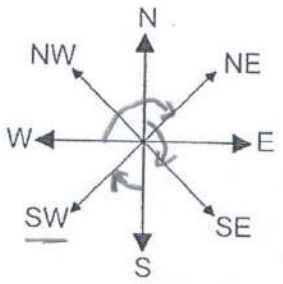


Shade any 6 of the smaller triangles

$\frac{6}{16} = \frac{3}{8}$

27. Fred is facing south. He turns through 45° in a clockwise direction.

$\frac{360}{8} = 45^\circ$



a. Which direction is Fred now facing?

Answer: SW

b. Johnny is facing west. How many degrees would he need to turn, clockwise, to face north east?

$3 \times 45^\circ = 135^\circ$

Answer: 135°

c. What is the size of the **reflex** angle between NE and W?

$360 - 135^\circ = 225^\circ$

Answer: 225°

d. Sandra is facing N and turns clockwise through 495°. In which direction is she now facing?

$495^\circ = 360 + 135^\circ$

↓

1 rotation

$135^\circ \Rightarrow$ SE

Answer: SE