



CITY OF LONDON  
FREEMEN'S SCHOOL

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## SAMPLE SCHOLARSHIP EXAMINATION PAPER

For pupils currently in Year 8

# MATHEMATICS

Time: 70 minutes

THESE INSTRUCTIONS WILL APPEAR ON THE SCHOLARSHIP  
EXAMINATION PAPER:

1. You may use a calculator.
2. All working out + Answers must be shown on separate file paper provided.
3. Do not write on the question paper.
4. Write in ink and draw diagrams where necessary in pencil.
5. Answer all questions but do not waste time. If you cannot do a question go on to the next one.
6. If an answer does not work out exactly, use 3 significant figures.
7. Hand in the question paper with your Script at the end of the examination.

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1. Tom had to do these calculations:

a] 
$$\frac{19.42 - 3.15 \times 4.26}{3.17 \div (4.16 + 3.67)}$$

b] 
$$\frac{(6.82)^2 \times 17.34}{8.97 - 3.14}$$

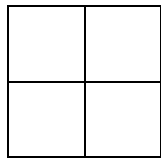
In each case:

- [i] Do the calculation.
- [ii] Estimate the answer by using approximations to 1 significant figure of each number in the calculation.
- [iii] State whether you think your answers to [i] and [ii] agree.

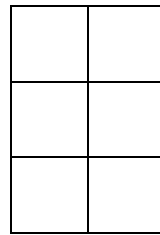
2. Shapes are made from matchsticks as shown below.



1 layer  
7 matches



2 layers  
12 matches



3 layers  
17 matches

a] Write down the number of matches needed for shapes with

- [i] 4 layers
- [ii] 5 layers
- [iii] n layers

b] Calculate the number of matches needed for a shape having 20 layers.

3. Solve these equations:

a]  $5x - 2 = 2x + 4$

b]  $5(3x + 2) - 4x = 87$

c]  $7 - 2(3x - 11) = 2$

4. The longer side of a rectangle is 3 cm greater than the shorter side.

If its area is  $24 \text{ cm}^2$ , use any method to calculate the size of the shorter side, correct to 1 decimal place.

*[Hint: You may use a trial and improvement method]*

5 Calculate, showing all your working:

Two thirds  $\times$  five eights divided by one and two ninths

6. a] The mean of six numbers is 25.5 and the mean of a further seven numbers is 23. What is the mean of all thirteen numbers combined?

b] The mean weight of six people in a lift is 90 kg. If the maximum total weight allowed in the lift is 1 tonne, approximately how many more people will be allowed in?

(1 tonne = 1000 kg)

7. a] Express 1764 as a product of its prime factors, and hence find its square root.

b] A teacup holds 0.2 litres and a pint milk bottle holds 0.57 litres of liquid. What fraction of a pint will the teacup hold?

c] Find the smallest prime number  $x$  which makes this inequality true:-

$$\frac{3}{8} < \frac{x}{12}$$

8. 3 children Alex, Ben and Cath play a game.

Each child holds up one, two or three fingers on one hand at the same time.

If all three children hold up the same number of fingers, Alex scores a point.

If only two children hold up the same number of fingers, Ben scores a point.

If all three children hold up different numbers of fingers, Cath scores a point.

a] List the possible outcomes.

b] Is the game fair?

c] What is the probability of each child winning?

9. A box measures 2m by 3m by 1m  
How many balls of diameter 20 cm could fit into the box ?  
Show on a sketch how you have arranged the balls.

The volume of a sphere is give by,  $\text{Volume} = \frac{4}{3} \pi r^3$  where r is the radius of the sphere,

Calculate what percentage of the space inside the box is taken up by the balls

