Mathematics Entrance Exam Syllabus for 11+ Entry to City of London School

There will be one paper, lasting 1 hour. Candidates can write in either pencil, blue or black ink. They will need a ruler. Calculators are not allowed.

The exam will be based on the topics below

Number

Multiplying or dividing by any 2-digit number. Adding, subtracting, multiplying and dividing decimals with up to 2 decimal places. Multiplying or dividing whole numbers, or decimals, by 10, 100 or 1000. Using negative numbers. Reducing fractions to their simplest form by cancelling common factors. Using ratio or direct proportion in simple problems. Calculating fractional or percentage parts of quantities. Understanding index notation such as 5^2 and 6^3. Understanding and using words or phrases such as 'prime', 'square root', 'cube root', 'factor', 'multiple', including expressing a number as a product of primes. Understanding and using brackets appropriately, including knowing the order in which arithmetic operations should be carried out (e.g. $1 + 2 \times 3 = 7$).

Shape, space and measures

Time: 12 and 24 hour clock. Money. Interpreting scale drawings, including maps. Using language associated with angles (acute, obtuse, reflex). Angles at a point total 360°, angles on a straight line total 180°, angles in a triangle total 180°. Find the perimeter of rectilinear shapes. Calculating the areas of rectangles and right-angled triangles; and the volumes of cuboids. Reflection and rotation symmetry; know the terms 'mirror line' and 'order of rotational symmetry'.

City of London School

Mathematics

Specimen 11+ Entrance Examination
Group 2

Name: ..... **Candidate number:** .....

- Write your name and candidate number in the box above
- **Calculators are not allowed**
- **Time: One hour**
- Required: Blue or black pen, pencil, ruler, eraser.
- Write your final answers on the dotted lines
- Show your working out clearly in the spaces provided
- Do not use other writing paper

Leave blank

		%
Score		
Total		
Marker		

1) For this question you can do rough working on the left hand side of the page if required. Put answers only in the spaces on the right.

(a) 0·12 × 1000 = 120

(b) The square root of 64 is 8

(c) 7^3 = 343

(d) The cube root of 27 is 3

(e) 14^2 = 196

(f) $\frac{90}{165}$ in its simplest form is $\frac{6}{11}$

(g) $\frac{7}{12}$ of 96 = 56

(h) 60% of 55 = 33

(i) 20% of 30% of 40% of 250 = 6

(a) 0·12 × 1000 (dp 3 places to RIGHT)
0.1200

(c) 7 × 7 = 49

(e) 14 × 14 = 56 + 140 = 196

(f) $\frac{90 \div 3}{165 \div 3} = \frac{30 \div 5}{55 \div 5} = \frac{6}{11}$

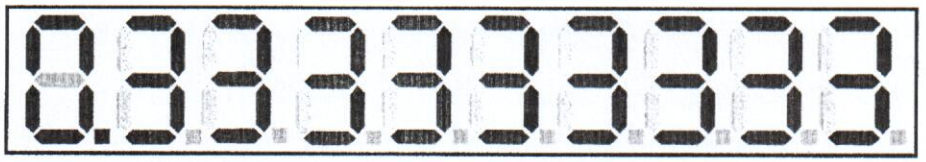
(h) 10% = 5.5, 5.5 × 6 = 33.0

55 / 3|165

(g) 96 ÷ 12 = 8, 8 × 7 = 56

(i) 40% of 250 = 25 × 4 = 100, 30% of 100 = 30, 20% of 30 = 30 ÷ 5 = 6.

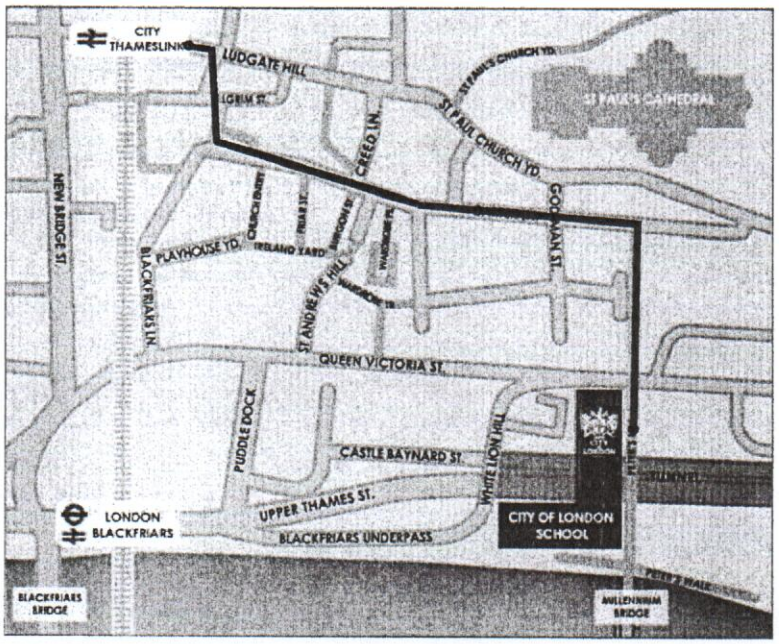
2) The calculator display below shows $\frac{1}{3}$ as a decimal. Complete the empty box to show how the calculator would display $\frac{1}{30}$. You do not need to write your digits in the same style, but you should use 10 digits.



0.033333333

It is a tenth smaller, so decimal place moves one place to the LEFT

3) Below is a map of the area surrounding City of London School drawn to a scale of **1 : 12500**



measure straight lines separately as :

3mm
12mm
30mm
30mm
29mm
104mm

Measure the walking route indicated between City Thameslink and City of London School, and complete the following:

The length of the route on the map in millimetres is ....104.....mm

The length of the route on the map in centimetres is ....10.4.....cm

The length of the route on the map in metres is ....0.104.....m

The real life walking route distance to the nearest 50 metres is

1300000mm
↓
130000 cm
↓
1300m

1 : 12500

so

10.4 × 12500

12500
0.104
50000
000000
1250000
1300000 mm

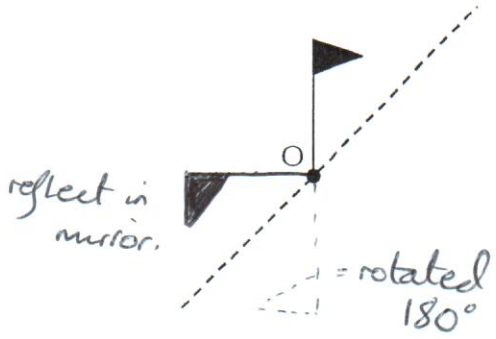
1300 .....m

4) State the order of rotational symmetry of this shape.

5

5 sided shape with 5 lines of symmetry, so therefore has order of rotational symmetry 5

5) The flag below is rotated 180° about the point O, and is then reflected in the mirror line. Draw on the diagram the final position of the flag. You should use a pencil and rubber to ensure your final answer is clear.



6)Write eighty thousand and forty in figures. ..... 8,040 .....

7) Work out 8386 ÷14.

$$\begin{array}{r} 599 \\ 14\overline{)8386} \\ 70\downarrow \\ \hline 138 \\ 126 \\ \hline 12\,6 \end{array}$$

$$\begin{array}{r} 14 \\ \times\ 9 \\ \hline 126 \end{array}$$

..... 599 .....

8) Nine identical discs numbered; 1, 3, 4, 5, 7, 8, 10, 11, 15 are put into a bag. One disc is selected at random. Giving your answers as fractions, find the probability of selecting:

$\frac{\text{number odd}}{\text{total number}} = \frac{6}{9} = \frac{2}{3}$

a) An odd number ..... 2/3 .....

$\frac{\text{mult of 5}}{\text{total}} = \frac{3}{9} = \frac{1}{3}$

b) A multiple of 5 ..... 1/3 .....

9) Fill in each box with one of the symbols +, −, ×, ÷ to make the calculations correct. You should use a pencil and rubber in order to ensure your final answer is clear.

$6 \boxed{\times} 4 \boxed{-} 9 = 15$

$7 \boxed{\times} 8 = 28 \boxed{\times} 2$ (56)

$(18 \boxed{+} 12) \boxed{\div} 6 = 5$

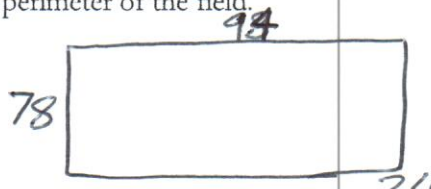
$30 \div 6 = 5$ ✓

10) A rectangular field is 94m long and 78m wide. Find the perimeter of the field.

94 × 2 = 188

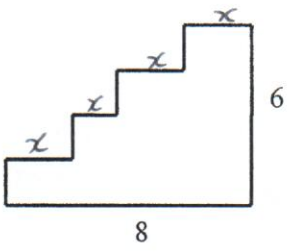
78 × 2 = 156

188 + 156 = 344



344 .....m

11) a)This four-step staircase shape, which is not drawn to scale, has a base length 8cm and a height 6cm. Find the perimeter of the shape



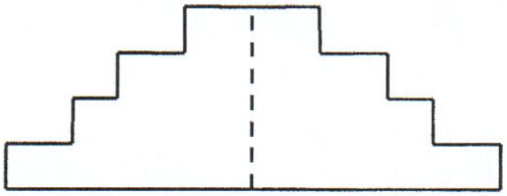
6 + 8 + 8 (all of horizontal of stairs - 8) + 6 (all vertical lines of stairs add up to 6)

= 16 + 12

= 28 cm

28 .....cm

b) Two copies of the shape are fitted together. Find the perimeter of the resulting shape.



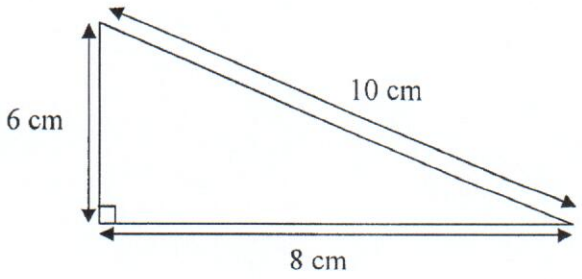
28 x 2 = 56 (but we lose the 6cm vertical one each stair)

56 - 12

= 44

44 .....cm

12) Find the area of this right-angled triangle.



24 .....cm²

area of triangle

$= \frac{1}{2} \times \text{base} \times \text{height}$

$= \frac{1}{2} \times 8 \times 6$

$= 4 \times 6$

$= 24\ cm^2$

13) The temperature in a garden was measured at midnight every night for a week. The results (in °C) were:

−3, 2, 1, 5, −5, 3, 4

Find:

a) The range in temperature. (hottest) biggest − coldest = 5 − (−5) = 10 ..... 10 .....°C

b) The mean temperature. −3 + 2 + 1 + 5, −5 + 3 + 4 = 7, 7 ÷ 7 = 1 ..... 1 .....°C

14) Find the number half way between 387 and 729.

729 − 387 = 342

$2\overline{)342}$ = 171 ↳ Find difference, half it and add to 387

387 + 171 = 558 ..... 558 .....

15) The numbers of five adjacent even-numbered houses add up to 930. What are the numbers of the houses?

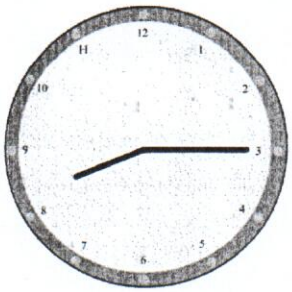
930 ÷ 5 = mean

$5\overline{)930}$ = 186 = middle house

Then add 2 to the right and −2 to the left

..... 182, 184, 186, 188, 190 .....

16) What is the obtuse angle between the two hands of a clock at quarter past 8?



each hour = 30° (360 ÷ 12)

3 → 8 = 5 hours

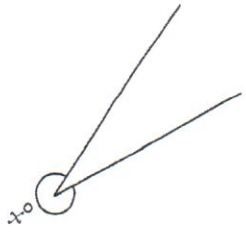
= 5 × 30 = 150°

Then hour hand is ¼ distance from 8 → 9, so 30 ÷ 4 = 7.5° ..... 157.5° .....

150 + 7.5 = 157.5°

$4\overline{)30.00}$ = 7.5

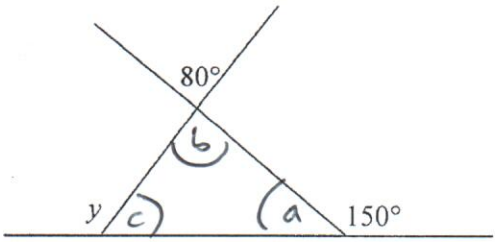
17) a)



Is the angle x acute, obtuse or reflex?

REFLEX

b) Calculate y. The diagram is not drawn to scale.



180 − 150 = 30°

b = 80 (opposite angles of 2 straight lines)

a + b = 30 + 80 = 110

so c = 180 − 110 = 70°

c + y = 180 so 70 + y = 180 → y = 180 − 70 = 110

110 °

18) Find the missing 3 digit number in this calculation: ??? ÷ 24 = 36

What ÷ 24 = 36

is the same as

36 × 24 = ???

864

$$\begin{array}{r} 36 \\ \times\ 24 \\ \hline 144 \\ 720 \\ \hline 864 \end{array}$$

19) Fill in the missing digits in this addition

(c) $2 + ? + ? = 2?$

must get to 2_81

so both must be 9,

then fill in the last box of $9+9+2 = 20$,

so 0 in the last box.

$$\begin{array}{r} 2\,\boxed{1}\,7 \\ +\boxed{9}\,1\,5 \\ +\,9\,4\,\boxed{9} \\ \hline 2\,\boxed{0}\,8\,1 \end{array}$$

(b) ? + 4 + 1 + 2 = 8

so must be 1

(a) 7 + 5 + ? give a unit of 1?

7 + 5 = 12 so must be 9

20) The Goldbach Conjecture states that every integer greater than 2 can be expressed (not uniquely) as the sum of two primes.

For example: 14 = 3+11 or 7+7.

Find as many ways as you can in which 36 can be written as the sum of two primes. Write your answers clearly on the dotted line and do any working below the line.

5 + 31, 7 + 29, 13 + 23, 17 + 19

5 + 31

7 + 29

13 + 23

17 + 19

(2 + 34 ×)

(3 + 33 (not prime) ×

(9 not prime)

11 + 25 (not prime) ×

21) A positive whole number less than 100 has remainder 2 when it is divided by 3, remainder 3 when divided by 4 and remainder 4 when divided by 5. What is the number?

remainder of 4 when divided by 5, so last digit must be a 9 or 4. BUT remainder 3 when divided by 4 → cannot be 4. → Last digit = 9

9 → × ÷ by 3

19 → rem 1 ÷ 3

29 → rem 1 ÷ 4

39 → ÷ 3

49 → rem 1 ÷ 3

59 → ÷ 3 rem 2, ÷ 4 rem 3 ✓

69

59

22)

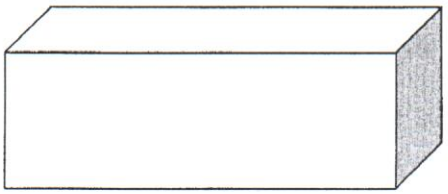


Diagram of a cuboid not drawn to scale

The following questions are about cuboids. Each part of the question refers to a different cuboid.

a) A cuboid with a base measuring 8cm by 10cm has a volume of 400cm³. Find its height.

$8 \times 10 = 80$

$80 \times \text{height} = 400$

$400 \div 80 = \text{height}$, height = 5

5 .....cm

b) Find the total surface area of a cuboid with dimensions 4cm by 2·5cm by 3·5cm.

$4 \times 2.5 = 10$

$4 \times 3.5 = 14$

$2.5 \times 3.5 = 8.75$

$10 + 14 + 8.75 = 32.75$, but there are 2 of each face, so $32.75 \times 2 = 65.5$

65.5 .....cm²

c) A cuboid's faces have areas 20cm², 24cm² and 30cm². Find its volume.

areas

20 24 30

2×10

$\rightarrow 4 \times 5$

sides must be 4×5 as 10 can't make 24. $4 \times 6 = 24$ $5 \times 6 = 30$ and $4 \times 5 = 20$

vol = $4 \times 5 \times 6$

$= 20 \times 6$

$= 120\ cm^3$

120 .....cm³

d) A cuboid's faces have perimeters 10cm, 12cm and 14 cm. Find its dimensions.

perim 10 12 14

$5 + 5$

$4 + 6$

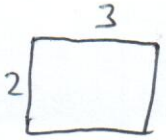
(values must be ÷2)

so must be 4 + 6

so sides are 2 and 3

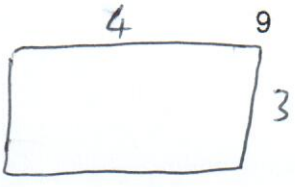
2 by 3 by 4

End of Exam



to make perimeter 10.

Perimeter 12



Perimeter 14

SPECIMEN MATHEMATICS PAPER:

GROUP II

1. $0.12 \times 1000 = 120$

   $\sqrt{64} = 8$

   $7^3 = 343$

   $\sqrt[3]{27} = 3$

   $14^2 = 196$

   $\frac{30}{165} = \frac{6}{11}$

   $\frac{7}{12} \times 96 = 56$

   $0.6 \times 55 = 33$

   $0.2 \times 0.3 \times 0.4 \times 250 = 6$

2. Calculator displays

   $\frac{1}{30} = 0.033333333$

3. 3 + 12 + 30 + 30 + 29

   = 104 mm (you should get between 100 mm and 108 mm)

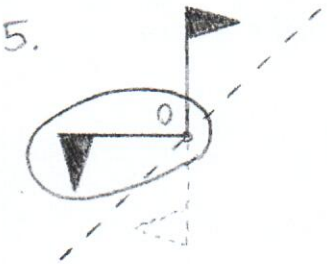
   = 10.4 cm

   = 0.104 m

   = 1300 m in red line

   (Adjust answers accordingly)

4. Symmetry order 5

5. 

6. 8,040

7. $8386 \div 14 = 599$

8. (a) $\frac{6}{9} = \frac{2}{3}$ (b) $\frac{3}{9} = \frac{1}{3}$

9. $6 \boxed{\times} 4 \boxed{-} 9 = 15$

   $7 \boxed{\times} 8 = 28 \boxed{\times} 2$

   $(18 \boxed{+} 12) \boxed{\div} 6 = 5$

10. $(94 + 78) \times 2 = 344$ m

11. (a) 28 cm (b) 44 cm

12. $\frac{1}{2} \times 6 \times 8 = 24\ cm^2$

13. (a) $5 - (-5) = 10^\circ C$

    (b) $\frac{7}{7} = 1^\circ C$

14. 558

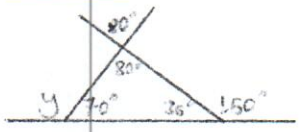
15. $930 \div 5 = 186$

    Houses are 182, 184, 186, 188, 190

16. 5 mins $= 30^\circ$

    Angle $= 5 \times 30 + \frac{30}{4} = 157.5^\circ$

17. (a) Reflex

    (b) 

    $y = 180 - 70 = 110^\circ$

18. $36 \times 24 = 864$

19. 2 1 7

    9 1 5

    + 9 4 9

    2 0 8 1

20. $36 = 5 + 31 = 7 + 29$

    $= 13 + 23 = 17 + 19$

21. 59

22. (a) 5 cm (b) $65.5\ cm^2$

    (c) Dimensions 4cm × 5cm × 6cm

    Volume $= 120\ cm^3$

    (d) Dimensions 2cm × 3cm × 4cm