Trinity School Croydon

ENTRANCE EXAM.

13+

SYLLABUS and SAMPLE QUESTIONS

(For candidates over 13 and under 14
on 1st September of year of entry)

Mathematics

The 13+ entrance examination is one hour long. The use of calculators is allowed.
If any unfamiliar techniques or notation are used they will be fully explained in the question concerned.
Some of the questions near the end of the paper are intended to be of an original nature and are particularly important for the award of Scholarships (e.g. Questions 26 to 29 in the example exam); their difficulty should **not** deter anyone from entering the exam.

13+ entrance examination syllabus
It is assumed that candidates are working at or about Level 5 to Level 6 of the National Curriculum. The paper will be in line with the teaching programme for Year 8 of the National Numeracy Strategy. The numbers in parenthesis ( ), refer to example questions on the practice paper which cover some part of that bullet point, but most probably not all.

Applying mathematics and solving problems
- Solve demanding problems and investigate in a range of contexts: number, algebra, shape, space and measures and handling data. (many!)

Numbers and the number system
- Read and write positive integer powers of 10; multiply and divide integers and decimals by 0.1,0.01 (1,5,9)
- Order decimals
- Round positive numbers to a given number of significant figures or decimal places. (6,12)
- Recognise and use multiples, factors, common factor, highest common factor, lowest common multiple and primes; writing a number as a product of its primes (e.g. $8000 = 2^6 \times 5^3$)(11, 15)
- Use squares, positive and negative square roots, cubes and cube roots, and index notation for positive integer powers. (5, 6, 8,11,13,)
- Using division to convert a fraction to a decimal, order fractions by using a common denominator or by converting to decimals; writing fractions in their lowest terms.(3,16)
- Add and subtract fractions by writing them with a common denominator, calculate fractions of quantities, multiply and divide an integer by a fraction. (7)
- Calculate percentages and find the outcome of a given percentage increase or decrease. (1,4,24)
- Reduce a ratio down to its simplest form, including a ratio expressed in different units (e.g. cm and m); divide a quantity into two or more parts in a given ratio; use the unitary method to solve simple word problems involving ratio and direct proportion.(26)
- Know and use the order of operations, including brackets and powers.(5,6,18,25)
- Use standard column procedures for multiplication and division of integers and decimals; understand where to position the decimal point by considering equivalent calculations.
- Use a calculator efficiently and effectively using the function keys for sign change, powers, roots; using brackets and the memory.(6,12,13,16,23,26,)

Algebra
- Know the meaning of the words formula and function. (12)
- Simplify or transform expressions by collecting like terms; multiply a single term over a bracket.(17)
- Construct and solve linear equations (unknown on either or both sides, without and with brackets).(22,25,27,28)
- Substitute integers into formulae and expressions involving small powers; derive simple formula.(12,18, 25, 27)
- Finding terms of a sequence; the nth term of a sequence. (8)

Shape, Space and Measures
- Solve geometrical problems involving:
  - angles and parallel lines, identifying alternate, corresponding and vertically opposite angles; identify perpendicular lines.(21)
  - side and angle properties of equilateral, isosceles and right angled triangles and special quadrilaterals. (10)
- Deduce and use formulae for the area of a triangle, rectangle, parallelogram and trapezium; calculate areas and perimeters of compound shapes made from rectangles and triangles.(20, 24)
- Know and use the formula for the volume of a cuboid; calculate volumes and surface areas of cuboids. (9)
- Use ruler, protractor and a pair of compasses to construct simple shapes including nets of simple 3–D shapes
- Co–ordinates in all 4 quadrants. (27)
- Converting one metric unit to another (e.g. grams to kilograms)(2,9,23)
- Accuracy and range of values (see question 23 of practice paper)

Handling data
- Understand and use ideas of probability; the probability scale from 0 to 1;finding probabilities based on equally likely outcomes. Know that if the probability of an event occurring is p, then the probability of it not occurring is 1–p; find and record all possible mutually exclusive outcomes for single events and two successive events in a systematic way, using diagrams and tables. (19, 24)
- Interpret diagrams and graphs; know how to find and use the mean, mode, median and range.(16, 24)

The exam paper is a combined question and answer paper. Space is given for workings for each question.
E.g.:

1) Find 15% of £6.40 giving your answer in pence.

Answer_____p [1]

13) A square has area 50 cm^2. Find the perimeter of the square giving your answer to 3 significant figures.

Answer_____cm [2]

The exam paper is a combined question and answer paper. Space is given for workings for each question e.g. see question 22.

1) Find 15% of £6.40

2) Write down the number of mm in 2.3 m

3) Write 3.16 as a mixed fraction in its lowest terms

4) Increase £30 by 17.5%

5) What is the value of: a) 2^4 b) 10^7 c) $(-7)^2$ d) $-5 + 1 + (-8)$

6) Use your calculator to find the value of $\sqrt{\frac{99 \times 77 + 316}{598 - 16 \times 11}}$ and give your answer to:

a) 5 decimal places b) 3 significant figures.

7) Showing non calculator methods: a) find the value of two thirds plus three-quarters
b) find how many two thirds are in five whole ones

8) The first four terms of a sequence are 3 9 27 81
a) What is the 5th term? b) What is the nth term?

9) There are 1000 cm^3 in a litre. Calculate the volume in litres of a fish tank measuring 30 cm by 50 cm by 85 cm.

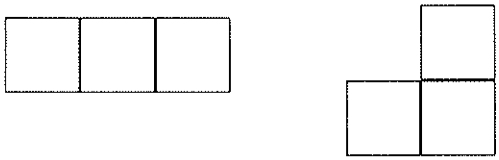
10) A quadrilateral has three angles equal and the other angle is 69°.
What is the size of each of the three equal angles?

11) The number 126 can be written as a product of prime numbers as 126 = 2x3x3x7.
Write the number 250 as a product of prime numbers.

12) The formula to find the circumference, C, of a circle is given by **C = π x d**, where d is the diameter of the circle and π is the number 3.142 (to 3 decimal places).
a) Find the circumference of a circle of diameter 6.8 cm. Give your answer to1decimal place
b) Use the formula **C = π x d** to find the diameter of a circle of circumference 100 cm.
Give your answer to 1 decimal place.

13) A square has area 50 cm^2. Find the perimeter of the square giving your answer to 3 significant figures.

14) There are just two ways of arranging three squares to form different tiles as shown.
(Tiles are not different if they can be rotated or flipped to form the other.)



Find the five different ways of arranging four squares.

15) Considering only the numbers from **20 to 30 inclusive** write down
a) The prime numbers b) The multiples of 3 c) A factor of 48
d) The number in which the sum of the squares of its digits is 40.

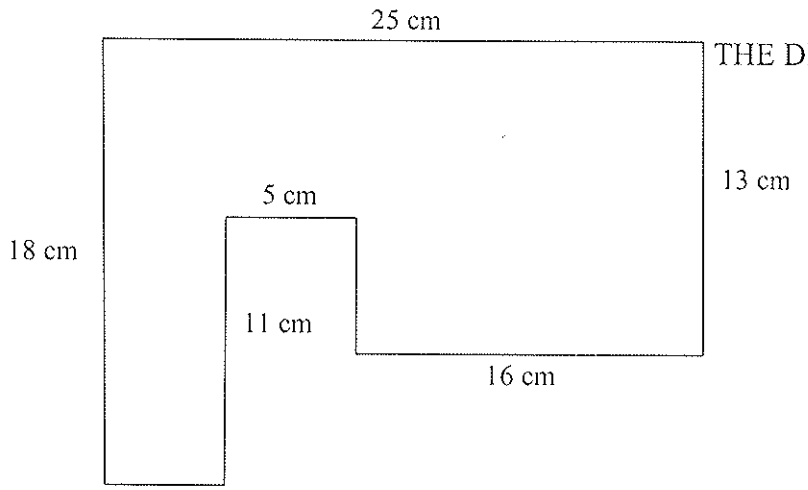
16) A CD contains fifteen tracks and the total playing time is 63 minutes. What is the mean length of a track?
Give your answer in minutes and seconds.

17) Simplify the following
a) $5x - 3x + 4x$ b) $3y \times 5y$ c) $8ab + bc + ba + 6b - 2cb - 3ab - b$ d) $5(3x - 8) + 7(3 - 2x)$ e) $(3x^2y^3)^2$

18) Given that $P = 3q - r$, **find**:
a) P when q= 7 and r= 5 b) r when P= 100 and q= 45 c) q when P = 240 and r= −2q

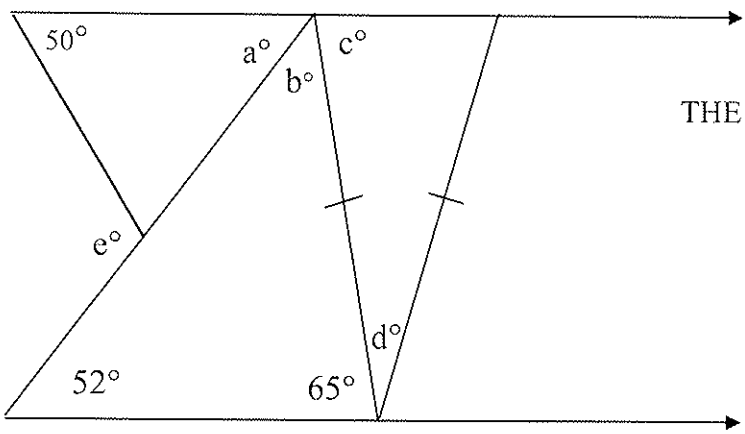
19) A big multi-pack of crisps contains ten bags of crisps.
Two are beef flavoured, three are cheese flavour and five are plain. Jack takes three bags at random.
What is the probability that the first bag is not cheese?
In fact the first two bags are both beef, what is the probability that the third bag is not cheese?

20) Calculate the area of the figure below; assume all angles are right angles.



THE DIAGRAM IS NOT TO SCALE

21) Calculate the missing angles in the diagram below. The two lines with the arrows are parallel.



THE DIAGRAM IS NOT TO SCALE

22) Solve the following equations to find the value of y in each case

a) $3y - 7 = 35$

Answer y= [2]

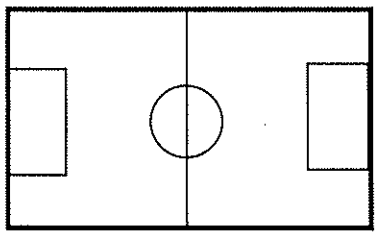
b) $3y - 7 = 37 + y$

Answer y= [2]

c) $\frac{1}{2}(5y + 3) - 7 = 4 - 2y$

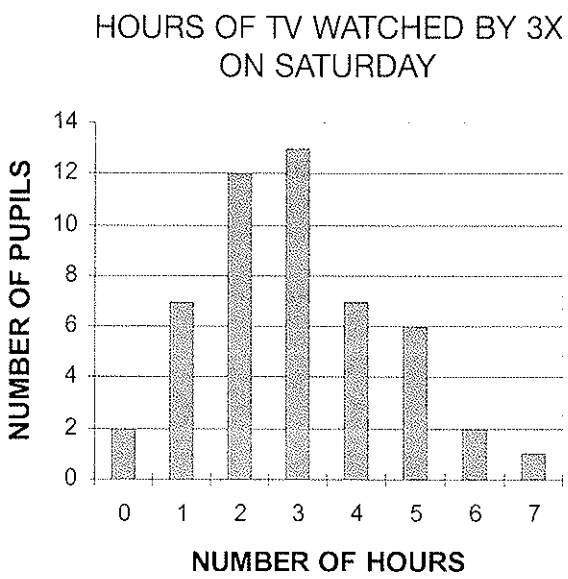
Answer y= [2]

23) A grounds-man marks out a football pitch.



He makes the pitch 95 metres long to **the nearest metre** and 50 metres wide to **the nearest metre**
a) What is the **shortest possible** length of the pitch?
b) What is the **shortest possible** width of the pitch?
c) Calculate the **smallest possible** area of the pitch.

24) The bar chart below shows the result of a survey amongst the 50 pupils in class '3X' on how much television they watched the previous Saturday.



a) How many pupils watched more than three hours of television?
b) How many hours of TV was watched altogether by the ten pupils who watched the most TV?
c) Find the percentage of the total time spent watching television that was watched by all those who saw exactly 3 hours of television
d) In fact one of the pupils who said they watched three hours of TV actually watched five hours of TV.

Work out who watched more TV in total; all those who watched 3 hours or all those who watched 5 hours? You must show calculations to support your answer.

25) P ∀ Q means find the mean of P and Q. So 9 ∀ 13 = (9+13) ÷2 = 11
a) Find 7 ∀ 17 b) Find (7 ∀ 17) ∀ 18 c) If P ∀ 25 = 42 find P

26) 8 km is approximately equal to 5 miles. Use this approximation to find:
a) how many miles are equivalent to 100 km
b) the length in km of a 26 mile marathon
Given also, that there are 3 feet in a yard and1760 yards in a mile **use the approximation** to find
c) how many cm there are in one foot to **1 decimal place**

27) a) The point (3, 2) lies on the line $4x - y = 10$ because $4x3 - 2 = 12 - 2 = 10$.
The point (1, q) also lies on this line, find the missing y-coordinate, q.
b) A is the point (2,5) and B is the point (–1, 2).
The points A and B lie on the line $ax + 3y = c$. Find the value of the numbers a and c.

28) A bottle contains 330 ml of mineral water. Jake drinks 50% more than Adam, and these two friends finish the bottle between them. What volume does Jake drink?

29) A book of stamps contains only 32p and 45p stamps.
The value of the book is £7.00. How many 45p stamps does it contain?

Answers to practice paper.

1. 96p
2. 2300
3. $3\frac{4}{25}$
4. £35.25
5. a) 16 b) 10000000 c) 49 d) –12
6. a) 4.33737 b) 4.34
7. a) $\frac{8+9}{12} = 1\frac{5}{12}$ b) $5 \times 3 \div 2 = 7\frac{1}{2}$
8. a) 243 b) 3^n
9. 127500 cm^3 = 127.5 litres
10. 360 – 69 =291, 291 ÷ 3 = 97
11. 2 × 5 × 5 × 5
12. a) 21.4 b) 100 ÷ 3.142 =31.8 cm
13. 4 × √50 =28.3
14. There are five different ways, enjoy finding them!
15. a) 23,29 b) 21,24,27,30 c) 24 d) 26
16. 4.2 minutes = 4 minutes 12 seconds
17. a) 6x b) $15y^2$ c) 5b + 6ab – bc d) 15x – 40 + 21 –14x =x – 19 e) $9x^4y^6$
18. a) 16 b) 35 c) 48
19. $\frac{7}{10}$ $\frac{5}{8}$
20. 208 + 72 + 35 =315 cm^2
21. a) 52 b) 63 c) 65 d) 50 e) 102
22. a) 3y = 42, y= 14 b) 2y =44, y = 22 c) 5y + 3 –14 = 8–4y, 9y=19, y= $\frac{19}{9} = 1\frac{1}{9}$
23. a) 94.5 b) 49.5 c) 94.5 × 49.5=4677.75 m^2
24. a) 7+6+2+1=16 b) 1×7 + 2×6 + 6×5 + 1×4 = 53 c) 39 ÷147 × 100 = 26.5 % d) 3×12 – 5×7=1; those who watched three hours watched most in total.
25. a) 12 b) 15 c) 59
26. a) 62.5 b) 41.6 c) 1 foot =30.3 cm (careful: 1m =3.3 foot was not asked for)
27. a) q=–6 b) 2a + 15 =c, –a + 6 =c, so 2a + 15=–a+6, 3a =–9, a=–3. c =9
28. 330 ÷ (1+1.5) = 132, 132 × 1.5 = 198 cl
29. To get a cost ending in 0p try ten or five 32p stamps. The final answer is 12 45p stamps.