SEVENOAKS SCHOOL

YEAR 9 (13+) ENTRANCE EXAMINATION

May 2018
for entry in September 2019

MATHEMATICS

Your Name: _____

Your School: _____

Time allowed: 1 hour

Equipment needed: Pen, pencil, eraser, ruler.

Information for candidates:

1. Calculators are NOT allowed.
2. Write your name and school on this page.
3. Write your answers on the question paper in the space provided.
4. There are 20 questions in this paper, try to answer all of them, but don't worry if you don't complete the paper. If you get stuck, just go on to the next question and if you have time at the end come back to the one(s) you left.
5. There are 64 marks in total available for this paper. Marks for each question are shown in square brackets [ ] after the question.
6. Show all your working. You may be awarded marks for correct working even if your final answer is incorrect, and a correct answer unsupported by correct working may not receive full marks.

1. A hard drive has enough storage space left for $7\frac{1}{2}$ hours of TV programmes. How many programmes each lasting $\frac{5}{6}$ of an hour can be recorded on the hard drive?

_____ [2 marks]

2. The numbers $\frac{1}{2}$, x, y, $\frac{3}{4}$ are in increasing order of size. The differences between successive numbers in this list are all the same. What is the value of y?

_____ [2 marks]

3. A baby weighs 4kg when he is born. One week later he weighs 8% less than his birth weight.

   (a) How much does the baby weigh when he is one week old?

_____ [2 marks]

The baby then gains 200g every **two weeks** for the next eight weeks.(b) How much does the baby weigh when he is nine weeks old?

_____ [2 marks]

4. Uncle Fred gives his nephew, Jack, and niece, Jill, £60 between them every year at Christmas. He splits it between them in the ratio of their ages.

   (a) The first time he does this Jack is 1 and Jill is 3. How much does Jill receive?

   _____ [1 mark]

   (b) How much does Jack receive the following Christmas?

   _____ [1 mark]

   (c) How old will Jack be when he receives £25 from Uncle Fred at Christmas?

   _____ [2 marks]

5. (a) What is the highest common factor of 735 and 756?

   _____ [2 marks]

   An area of land measures 735 metres by 756 metres. It is to be divided up into square plots of equal size.

   (b) What is the area of the largest squares that will fit on it?

   _____ [1 mark]

   (c) How many squares will fit on it?

   _____ [1 mark]

6. For the following sequence: 6, 15, 24, 33, ...

   (a) write an expression for the nth term;

   _____ [1 mark]

   (b) find the 10th term.

   _____ [1 mark]

7. Simplify fully each of the following expressions:

   (a) $2pq \times 3p$

   _____ [1 mark]

   (b) $\dfrac{14ab}{7ab^2}$

   _____ [1 mark]

   (c) $\dfrac{8 + 4x}{2x + 2}$

   _____ [1 mark]

8. Expand and simplify fully each of the following expressions:

   (a) $7(x - 2) - 2(2x + 7)$

   _____ [1 mark]

   (b) $(x + 7)(x - 12)$

   _____ [2 marks]

9. Solve each of the following equations:

(a) $4x = -28$

_____ [1 mark]

(b) $\dfrac{x+7}{2} = 3$

_____ [1 mark]

(c) $5x - 9 = x - 3$

_____ [2 marks]

(d) $7(x-1) = 4(x+2)$

_____ [2 marks]

10. There are 1176 students in a school. The number of girls is 28 less than the number of boys. How many boys are there in the school?

_____ [2 marks]

11. A teacher hires a coach for a school trip. The cost is worked out using the formula $C = \frac{m}{3} + 40$, where C is the cost in pounds and m is the number of miles the coach travels.

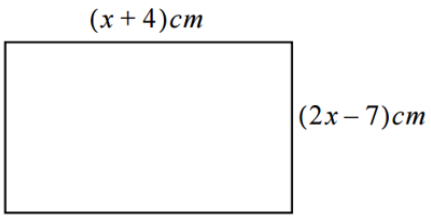
(a) Calculate how much it would cost to hire the coach to travel a distance of 42 miles.

_____ [2 marks]

(b) If the cost of the hire is £75, how many miles does the coach travel?

_____ [2 marks]

12. A rectangle has a length of $x + 4$ cm and a width of $2x - 7$ cm.



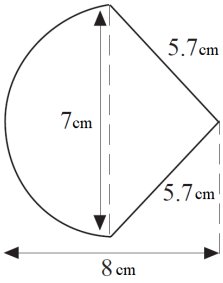
(a) If the perimeter is 36cm, what is the value of x?

_____ [2 marks]

(b) What is the area of the rectangle?

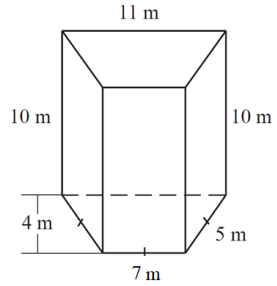
_____ [2 marks]

13. Find the total area of the shape below, comprised of a triangle and semicircle. Give your answer in terms of π.



_____ [4 marks]

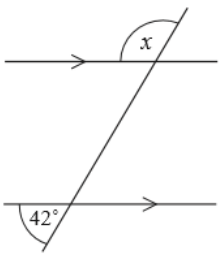
14. Find the volume of this trapezoidal prism.



_____ [2 marks]

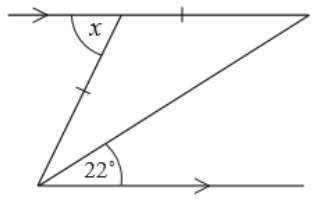
15. Calculate the angle marked x in each of the following diagrams:

(a)



_____ [1 mark]

(b)



_____ [1 mark]

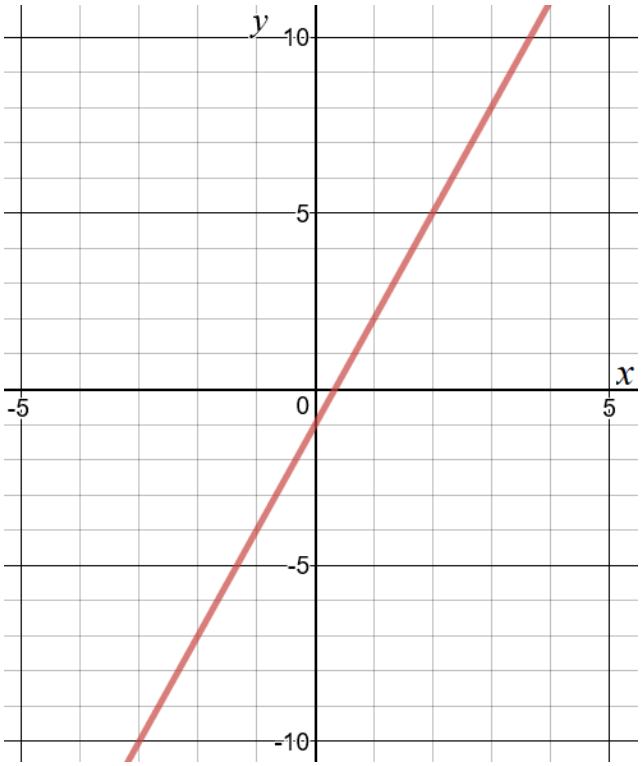
16. (a) Write 7.845 correct to 2 decimal places.

_____ [1 mark]

(b) Write 2.093 correct to 3 significant figures.

_____ [1 mark]

17. (a) What is the equation of the straight line drawn on the grid below?



_____ [2 marks]

(b) Complete the table of values for another straight line, $y = -2x + 2$.

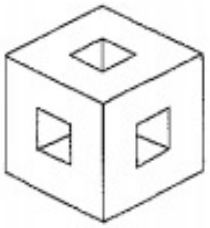
x	-3	-2	-1	0	1	2	3
y				2			-4

[2 marks]

(c) Use your table of values to plot the line $y = -2x + 2$ on the grid above.

[2 marks]

18. A 3cm by 3cm by 3cm cube has three holes, each with a 1cm by 1cm cross section running from the centre of each face to the centre of the opposite face. What is the total surface area of the resulting solid (including the internal surfaces)?



_____ [2 marks]

19. A rectangle with area 125cm^2 has sides in the ratio 4:5. What is the perimeter of the rectangle?

_____ [3 marks]

20. In a magic square each row, each column and both main diagonals have the same total. What number should replace x in this partially completed magic square?

13		
5		15
x		

_____ [3 marks]

END OF PAPER