SEVENOAKS SCHOOL

YEAR 9 (13+) ENTRANCE EXAMINATION

April 2022
for entry in September 2023

MATHEMATICS

Your Name: _____

Your School: _____

Time allowed: 1 hour

Equipment needed: Pen, pencil, eraser.

Information for candidates:

1. Calculators, rulers and protractors 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. Some of the later questions might be easier than the earlier questions, so do not spent too long on any question. You can always go back.
5. You should not need to do any long calculations. If you find yourself doing long calculations you might be able to find a better way.
6. Some questions might rely on answers to previous questions.
7. Read the question carefully. 'Write down' means something different to 'calculate' or 'find'.
8. There are 60 marks in total available for this paper. Marks for each question are shown in square brackets [ ] after the question.
9. 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.

Glossary for candidates with English as an additional language

Protractor – an instrument for measuring angles, typically semi-circular

Perimeter – distance around the outside of a shape

1. a. Find the next three terms in each of these sequences:

(i) 8, 11, 14, 17, 20, …

_____ [1]

(ii) 4, 7, 12, 19, 28, …

_____ [1]

b. A sequence starts 1, 4, 9, 16, 25, …. Find the 20^{th} number in this sequence.

_____ [2]

c. Find a formula for the n^{th} term of the sequence which starts 7, 9, 11, 13, 15, ….

_____ [2]

d. I have a sequence where each term is the sum of the two terms before it. I have forgotten the first three numbers in the sequence, but the fourth to eighth numbers are 4, 7, 11, 18, 29. Find:

(i) the tenth number

_____ [1]

(ii) the first number

_____ [1]

2. a. Simplify:

(i) $5x + 2x - 3x$

_____ [1]

(ii) $3ab + 2a^2 + 4ba - 2a^2$

_____ [2]

(iii) $5x - (2x + 1)$

_____ [2]

b. If $p = 5$, $q = 2$ and $r = -3$, find:

(i) $2p + q$

_____ [1]

(ii) $pq - r$

_____ [1]

(iii) $\frac{r^2+p}{q}$

_____ [2]

c. If $a - b = 5$, find the value of $3a - 3b$.

_____ [1]

d. (i) Freddie has five times as many sweets as Marcus. If Marcus has x sweets, write down an expression for how many sweets Freddie has.

_____ [1]

(ii) Freddie gives six sweets to Marcus. Write down expressions for the number of sweets each has now.

Freddie: _____ Marcus: _____ [1]

(iii) Freddie now has three times as many sweets as Marcus. Using your answers to part (ii), find how many sweets Marcus started with.

_____ [2]

3. a. For the list of numbers: 8, 5, 6, 8, 9, 6, 4, 8, find:

(i) the mean

_____ [2]

(ii) the range

_____ [1]

b. Six boys and four girls take a test. The boys get a mean score of 71 and the girls get a mean score of 74. Find the mean of all ten children.

_____ [2]

c. I think of four whole numbers.
The mode of the four numbers is 12.
The median of the four numbers is 10.
The range of the four numbers is 5.
Find the four numbers.

_____ [2]

4. a. Simplify the following:

(i) $m^2 \times m^5$

_____ [1]

(ii) $\frac{q^7}{q^4}$

_____ [1]

(iii) $(x^4)^3$

_____ [1]

b. $16^3 = 4096$. Use this fact and your answer to part (iii) to find $\sqrt[12]{4096}$

_____ [2]

c. Circle all the numbers below which are multiples of 12. There may be more than one answer.

$2^4 \times 3 \times 7^4 \times 11$ $2 \times 3^5 \times 5^2 \times 7^4 \times 11^2$

$2^6 \times 5^3 \times 7^5 \times 11^3$ $2 \times 3^2 \times 5^4 \times 7^6 \times 11^3$

_____ [2]

5. a. Calculate the following:

(i) $\frac{3}{4} - \frac{1}{5}$

_____ [2]

(ii) $\frac{2}{3} \times \frac{9}{10}$

_____ [2]

(iii) $2\frac{3}{4} + 1\frac{2}{3}$

_____ [2]

b. Show that $1\frac{1}{4} \times \frac{4}{5} = 1$.

_____ [2]

c. The price of a diamond ring is increased by 25%. The following week it is reduced back to its previous price. By what percentage was it reduced?

_____ [1]

d. Write down the value of $\frac{7}{8} \times \frac{6}{7} \times \frac{5}{6} \times \frac{4}{5} \times \frac{3}{4} \times \frac{2}{3} \times \frac{1}{2}$

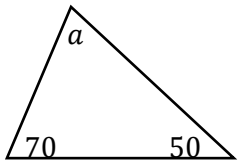
_____ [1]

e. Tim and Alanna have to mark some exam papers. If Tim worked alone it would take him 12 hours to mark them all. If Alanna marked them all it would take her 6 hours to mark them all. How long will it take them to mark all the exams if they do the marking together?

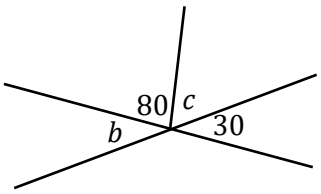
_____ [2]

6. Find the size of each of the angles marked with letters. The diagrams are not drawn to scale so you cannot measure them with a protractor:

(i)



(ii)

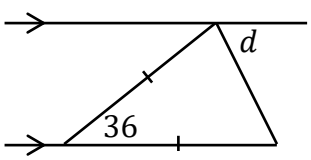


a= _____ [1]

b= _____ [1]

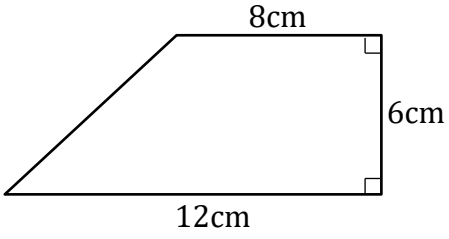
c= _____ [1]

(iii)



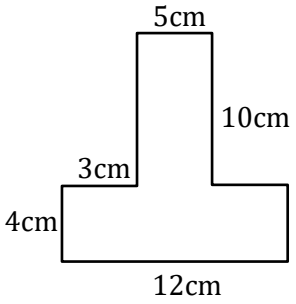
d= _____ [1]

b. Find the area of this trapezium.



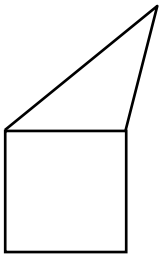
Area = _____ [2]

c. Find the perimeter and area of the shape shown.



Perimeter = _____ [2] Area = _____ [2]

d. In this question, the square and the triangle have the same perimeter. Find the ratio of the perimeter of the irregular pentagon to the perimeter of the square.



_____ [2]

End of test. Now go back and check your work.