Total Mark _____

Emanuel School

# Entrance Exam

## Mathematics

## 13+ Entry

## Time Allowed: 1 HOUR

| | |
|---|---|
| Surname | |
| First Name | |
| School | |

**Fill in the boxes above and read the following carefully:**

1. Answer all 22 questions in the spaces provided in the order set.
2. If you cannot answer a question, move on to the next one.
3. Show all your working out in this booklet.
4. Cross out all work which you do not want marked.
5. Give all answers that are fractions in their simplest form
6. The total marks in the paper is 100.
7. **You may <u>not</u> use a calculator.**

1. Calculate the following:

a) $72 \times 36$

Answer _____[1]

b) $945.72 - 32.976$

Answer _____[1]

c) $0.72 \div 1.2$

Answer _____[1]

d) $124.67 + 38.987$

Answer _____[1]

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2. Work out the following, leaving your answer as a simplified mixed number, where possible:

a) $\frac{3}{5}+\frac{2}{7}$

Answer _____[2]

b) $3\frac{1}{8}\times\frac{2}{5}$

Answer _____[2]

c) $1\frac{2}{3}-\frac{4}{7}$

Answer _____[2]

d) $(\frac{5}{11}-\frac{1}{3})\times\frac{1}{8}$

Answer _____[2]

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3. Write 4.7058 to

a) 2 decimal places

Answer: _____ [1]

b) 1 significant figure

Answer: _____ [1]

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4.

a) Write $\frac{3}{8}$ as

i. a decimal

Answer: _____ [2]

ii. a percentage

Answer: _____ [1]

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5. I buy a rare gemstone for £3500. After one year the value of the crystal has increased by 13%.

   Calculate how much the gemstone is worth after one year.

Answer: £_____ [2]

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6. If $a = 3, b = -2 \; and \; c = 4$, find the value of the following expressions:

   a) $a + c$

Answer: _____ [1]

   b) $ac$

Answer: _____ [1]

   c) $ab - bc =$

Answer: _____ [2]

   d) $c^2(b - a)$

Answer: _____ [2]

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7.

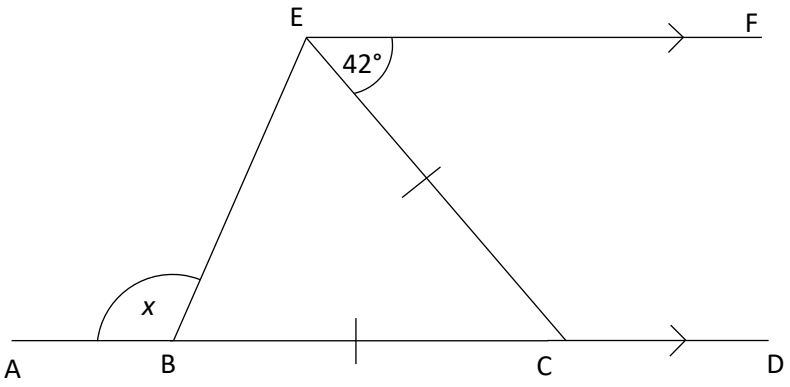



Diagram **NOT** accurately drawn

ABCD is a straight line and is parallel to the line EF
BC = EC

Calculate the size of the angle marked *x*.

Answer: _____ [3]

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8. Simplify the following expression:

a) $5x - 6y + x + 4y$

Answer: _____ [2]

b) $4xy - 2x^2 + 7y - xy + 2y - x^2$

Answer: _____ [2]

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9. Expand and simplify the following expressions:

a) $4(p-2)$

Answer: _____ [2]

b) $y(4y-3)$

Answer: _____ [2]

c) $3(x+2)-4(2-x)$

Answer: _____ [3]

d) $(x+2)(2x-3)$

Answer: _____ [3]

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Page total:

10. Factorise the following expressions fully:

a) $6c^2 - 8c$

Answer: _____ [2]

b) $xy^2 - yx^3 + yx$

Answer: _____ [2]

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11. Simplify fully: $\frac{12xz^3}{8xz^2}$

Answer: _____ [2]

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12. Solve the following equations for $x$ (leave your answer as a fraction where necessary):

a) $4(2x - 1) = 12$

Answer: $x =$ _____ [2]

b) $4(2x + 1) - 3x^2 = x(5 - 3x)$

Answer: $x =$ _____ [3]

c) $\frac{2x}{3} - 1 = 6$

Answer: $x =$_____ [2]

d) $\frac{2}{x} + 3 = 4$

Answer: $x =$_____ [2]

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13. If the letters of the word EMANUELGREAT are cut up and put in a bag, what is the probability of selecting:

a) an M

Answer: _____ [1]

b) a vowel

Answer: _____ [1]

c) a B

Answer: _____ [1]

d) I take a letter out of the bag, make a note of the letter and **replace** the letter. If I repeat the above for 240 times how many letter M's would I expect to obtain?

Answer: _____ [2]

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14. Below is a sequence of numbers:

25, 19, 13, 7, …

a) Calculate the:

(i) $6^{th}$ and $7^{th}$ terms,

Answer: _____ [1]

(ii) $98^{th}$ term,

Answer: _____ [3]

b) Below is a different sequence of numbers,

$2, 5, 10, 17, ...$

(i) $5^{th}$ and $6^{th}$ terms,

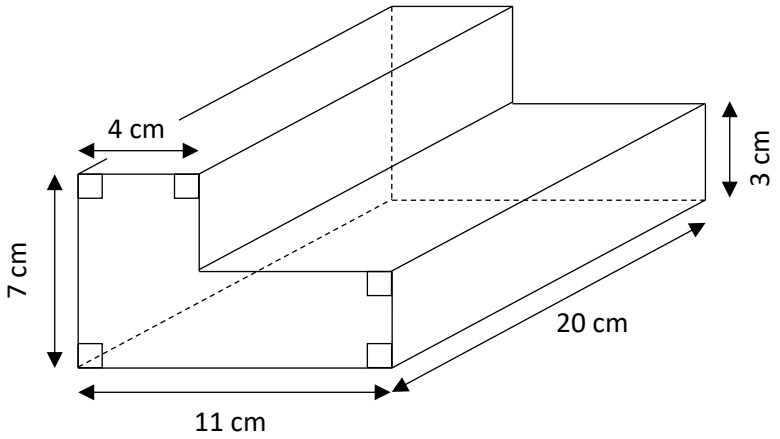
Answer: _____ [2]

(ii) A formula for the nth term,

Answer: _____ [2]

15. A solid prism has dimensions as shown.

Diagram **NOT** accurately drawn



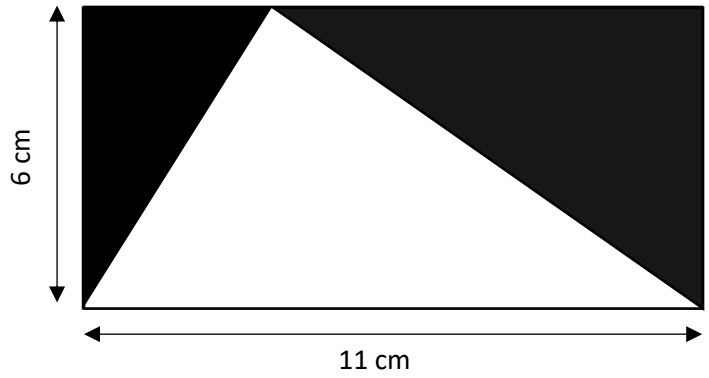

Calculate the volume of the prism.

Answer:_____$cm^3$ [3]

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16. Work out the shaded area of the shape below:




Answer _____ $cm^2$ [3]

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17. Wilson thinks of a number. When he multiplies it by 10 and subtracts 4, he obtains the same number as if he had multiplied it by 7 and added 2. What number did Wilson start with?

Answer _____[3]

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18.

Below is a list of the ages of the five cats Mr Bishop owns:

$$5, 6, 10, 8, 6$$

a) Calculate the mean age for Mr Bishop's cats

Answer _____[2]

b) The median age for Mr Bishop's cats

Answer _____[2]

c) Nithu has 5 cards. The mean of the five cards is 6. The range of the five cards is 6. What numbers are on the two other cards?

| 6 | 6 | 6 | ? | ? |
|---|---|---|---|---|

Answer _____ and _____[2]

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19.

a) Bob, Mike and Sarah share some jelly beans in the ratio 3 : 2 : 1. There are 54 jelly beans in total. Calculate the number of jelly beans that Bob, Mike and Sarah will each receive.

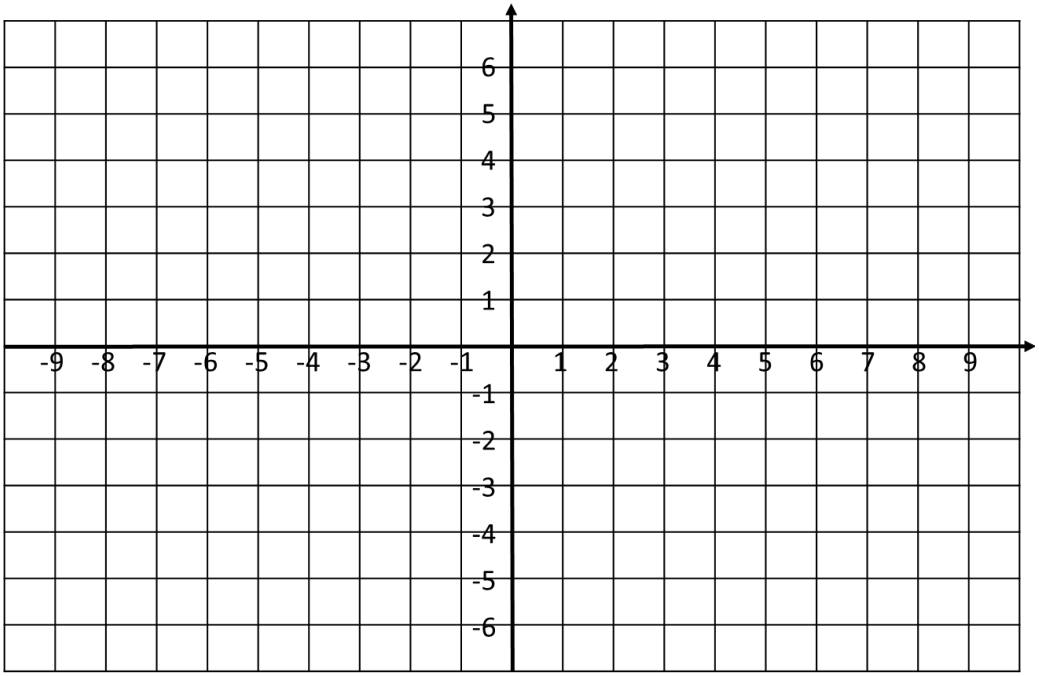
Answer: _____ : _____ : _____ [2]

b) The ratio of boys to girls in a room is 2 : 3. There are 80 children in the room in total. Calculate the new ratio in its lowest form of boys to girls if 4 additional boys enter the room.

Answer: _____:_____ [2]

20.

a) On the graph below, plot the points A, (1,1), B, (-3,5) and C, (5,4) and join them up to make a triangle.




[2]

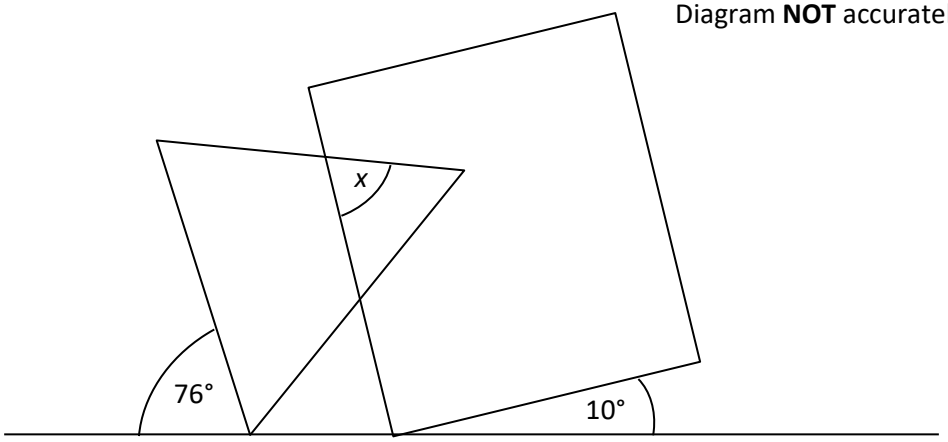
b) Reflect the triangle ABC in the line $y = -1$

[2]

21. The diagram shows an equilateral triangle and a square.

Find the size of angle *x*.

Diagram **NOT** accurately drawn




Answer: _____ [3]

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22. All the letters in the alphabet represent different positive whole numbers.

For example, if R = 5, O = 3 and S = 4 then ROS = 5 × 3 × 4 = 60

If BIBLE = 66 and BALL = 28, find the value of LIBEL.

Answer: _____ [4]

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***This is the end of the test. Go back and check your answers carefully.***

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