ST ALBANS SCHOOL

11+ Mathematics Examination

Specimen Paper

The use of a calculator is not allowed
Geometrical instruments, such as protractors, are not required.

Remember that marks may be given for correct working.

1. The following fractions are equivalent. Fill in the missing numbers.

$$\frac{\quad}{8} = \frac{9}{12} = \frac{21}{\quad}$$

2. Calculate 129×32

3. Given that $42 \times 17 = 714$, write down the answer to

(a) 42×34

(b) $714 \div 21$

(c) 4.2×17

4. Write

(a) 0.37 as a percentage.

(b) $\frac{4}{5}$ as a decimal

(c) 43% as a fraction

(d) $3+\frac{123}{100}$ as a decimal

5. Find $35\% \; of \; 80kg$

6. Write in figures the number "two hundred and three thousand, one hundred and seventy"

7. Calculate $0.871 - 0.39 + 1.4$

8. Given that $\frac{1}{6} + \frac{1}{2} = \frac{2}{3}$,

What is $\frac{2}{3} - \frac{1}{2}$?

9. Fill in the missing numbers in this division

$$6\overline{)\ldots\ 3\ 8}\qquad \ldots\ 7\ \ldots$$

10. What time is 1 hour and 37 minutes later than $14:48$?

11. If $\frac{2}{3}$ of a number is 14, what is the number?

12. I think of a number multiply it by 3 and then subtract 8. If the answer is -5, what number did I start with?

13. (a) What number is half way between 3.2 and 5.6?

(b)What number is half way between -6 and $+4$?

14. Complete these calculations

(a) $21\times 6+9\times 6=.....\times 6$

$=$

(b) $17\times 14+16\times 7=.....\times 7+.....\times 7$

$=$

$=$

15. A space ship travels at 193 metres per second for 5 minutes 7 seconds. Use approximations to decide whether the distance travelled will be nearer to 1 km, 10 km, 60 km or 600 km. (You must show your working.)

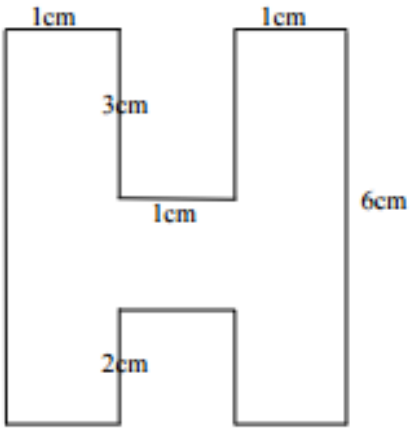
16. Tom only has 4 Smarties left, one each of Red, Green, Orange and Yellow. If he chooses 2 Smarties, list all the possible combinations of colours.

17. In a bowl there are 6 apples, 3 plums and 4 peaches. If I choose one piece of fruit at random, what is the probability

    (a) That it is not a plum?

    (b) That it is a banana?

18. (a) Find the area of this shape.



(b) Find the perimeter.

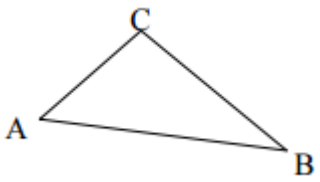
19. In the sequence $1, 3, 4, 7, 11 \ldots\ldots$ each number after the second is the sum of the two previous numbers of the sequence. What is the $10th$ number of the sequence?

20. The length of a rectangle is twice its width. Its area is $98cm^2$. Find its length and width.

21. In this question the diagrams are not drawn accurately, so the angles cannot be found by measuring with a protractor.

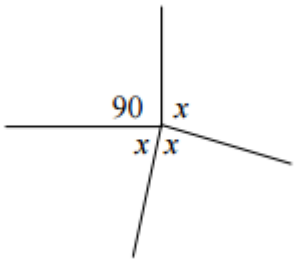
    The angles of a triangle add up to 180°.

    (a) In this triangle angle A is the same as angle B, and angle C is twice angle B. Work out each of the three angles.



The angles round a point add up to 360°.

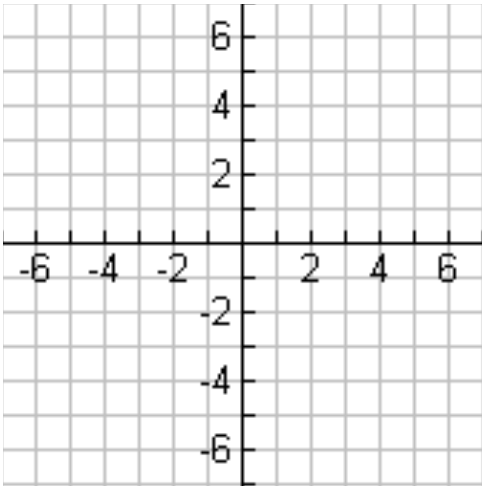
(b) In the diagram below, one angle is 90° and the other three are equal to each other. Work out the missing angles.



22. (a) Plot the following points

$$(2,4),(-3,1),(-2,-3)$$

Join them to form a triangle.

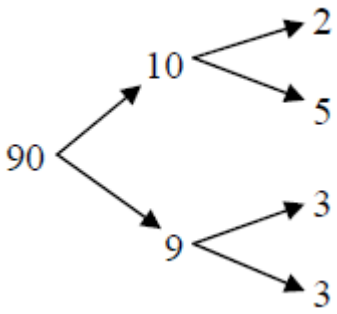


(b) Draw another triangle joined onto this one so that the combined shape has one line of symmetry.

23. (a) List the prime numbers less than 20.

(b) A factor tree can be used to write a number as the product of prime factors.

For example



So $90 = 2 \times 5 \times 3 \times 3$

By drawing a factor tree, or using any other method you know, write 36 as the product of prime factors.

(c) Find the Lowest Common Multiple (LCM) of 24 and 36

24. An approximate method of deciding how much sleep a young person needs is to subtract their age from 33 and divide by 2 .

(a) How much sleep does an eleven year old need?

(b) How old is a person who needs 5 hours sleep?

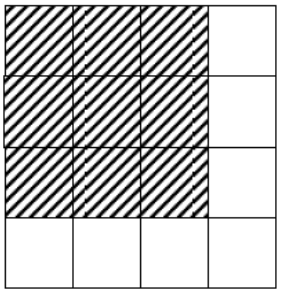
(c) How old is the person who needs no sleep at all? (If the formula is correct!)

(d) Does it make sense to use the formula for older people? Give a reason for your answer.

25. Nine bus stops are equally spaced along a bus route. The distance from the first to the third is 600 metres. How far is it from the first to the last?

26. When asked how many chickens and cows he had on his farm Mr Brown refused to answer directly, but he did say that the total number of heads was 30 and the total number of legs was 100 . How many of each was there?

27. Inside the large square (of "size 16") a smaller square of "size 9" is shown shaded.



(a) How many different "size 9" squares are there inside the large square?

(b) How many different "size 4" squares are there inside the "size 16" square?

(c) How many different squares are there in total, taking into account all sizes and positions?

This specimen paper is of only approximately the same length as the entrance examination. This paper is intended to give an indication of the level of knowledge expected from candidates and the general layout and style of the paper. Questions on any particular topic may be easier or more difficult than those in this specimen, and questions requiring logical thinking, without any specific mathematical knowledge, will also be included.

SOLUTIONS

1. $\frac{6}{8} = \frac{9}{12} = \frac{21}{28}$

2. Calculate

$$\begin{array}{r} 129 \\ \times 32 \\ \hline 258 \\ 3870 \\ \hline 4128 \end{array}$$

3. Given that $42 \times 17 = 714$, write down the answer to

(a) $42 \times 34 = 1428$

(b) $714 \div 21 = 34$

(c) $4.2 \times 17 = 71.4$

4. Write

(a) $0.37 = 37\%$

(b) $\frac{4}{5} = 0.8$

(c) $43\% = \frac{43}{100}$

(d) $3 + \frac{123}{100} = 4.23$

5. Find $35\% \ of \ 80kg$

$10\% = 8 \quad 5\% = 4 \quad (3 \times 8) + 4 = 28kg$

6. Write in figures the number "two hundred and three thousand, one hundred and seventy"

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7. Calculate $0.871 - 0.39 + 1.4$

$0.871 - 0.39 = 0.481$

$0.481 + 1.4 = 1.881$

8. Given that $\frac{1}{6} + \frac{1}{2} = \frac{2}{3}$, $\frac{2}{3} - \frac{1}{2} = \frac{1}{6}$

9. Fill in the missing numbers in this division

$$6\overline{)4\,3\,8} = 7\,3$$

10. What time is 1 hour and 37 minutes later than $14:48$? $16:25$

11. If $\frac{2}{3}$ of a number is 14, what is the number? 21

12. I think of a number multiply it by 3 and then subtract 8. If the answer is -5, what number did I start with?

$(-5+8)\div 3 = 1$

13. (a) What number is half way between 3.2 and 5.6? 4.4

(b)What number is half way between -6 and $+4$? -1

14. Complete these calculations

(a) $21\times 6+9\times 6=30\times 6$

$=180$

(b) $17\times 14+16\times 7=34\times 7+16\times 7$

$=50\times 7$

$=350$

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15. A space ship travels at 193 metres per second for 5 minutes 7 seconds. Use approximations to decide whether the distance travelled will be nearer to 1 km, 10 km, 60 km or 600 km. (You must show your working.)

$5\times 60=300$ $300+7=307\approx 300$ $193\approx 200$

$200\times 300=60000m=60km$

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16. Tom only has 4 Smarties left, one each of Red, Green, Orange and Yellow. If he chooses 2 Smarties, list all the possible combinations of colours.

Red, Green
Red, Orange
Red, Yellow
Green, Orange
Green, Yellow
Orange, Yellow

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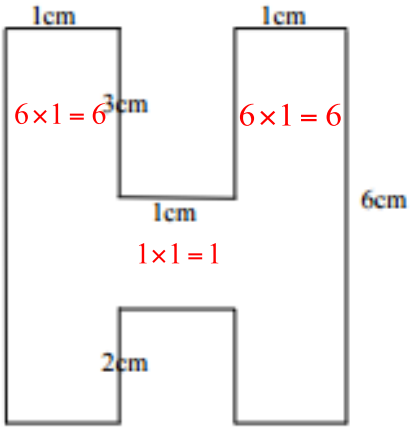
17. In a bowl there are 6 apples, 3 plums and 4 peaches. If I choose one piece of fruit at random, what is the probability

(c) That it is not a plum? $\frac{10}{13}$

(d) That it is a banana? 0

18. (a) Find the area of this shape.

$6+6+1=13cm^2$



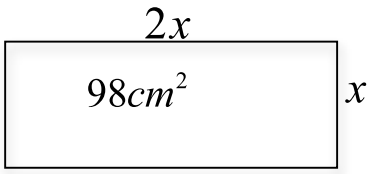
(b) Find the perimeter.

$6+1+3+1+3+1+6+1+2+1+2+1=28cm$

19. In the sequence $1, 3, 4, 7, 11 \ldots\ldots$ each number after the second is the sum of the two previous numbers of the sequence. What is the $10th$ number of the sequence?

$1, 3, 4, 7, 11, 18, 29, 47, 76, 123$

20. The length of a rectangle is twice its width. Its area is $98cm^2$. Find its length and width.



$2x \times x = 98$

$2x^2 = 98$

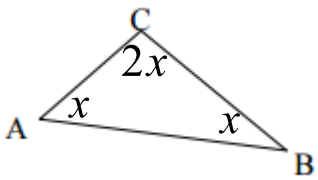
$x^2 = 49$

$x = 7 \qquad 2x = 14$

21. In this question the diagrams are not drawn accurately, so the angles cannot be found by measuring with a protractor.

The angles of a triangle add up to 180°.

(d) In this triangle angle A is the same as angle B, and angle C is twice angle B. Work out each of the three angles.



$x + x + 2x = 180^\circ$

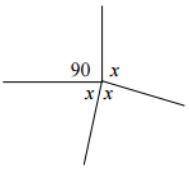
$4x = 180^\circ$

$x = 45^\circ$

$45^\circ, 45^\circ, 90^\circ$

The angles round a point add up to 360°.

(e) In the diagram below, one angle is 90° and the other three are equal to each other. Work out the missing angles.



$3x + 90 = 360^\circ$

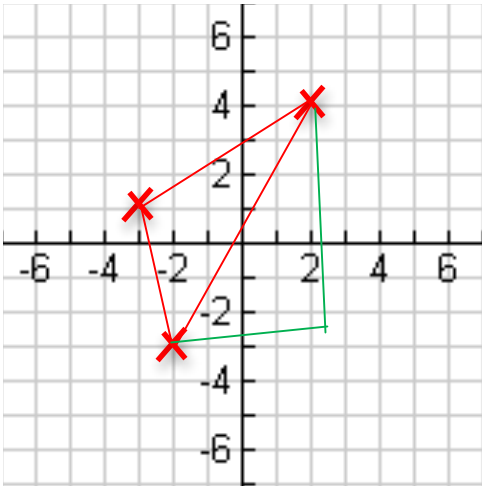
$3x = 270^\circ$

$x = 90^\circ$

22. (a) Plot the following points

$$(2,4),(-3,1),(-2,-3)$$

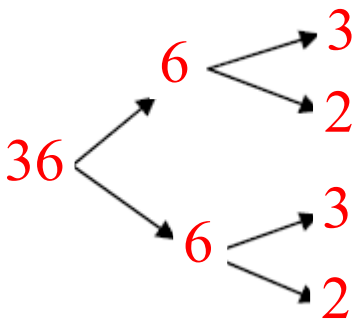
Join them to form a triangle.



(b) Draw another triangle joined onto this one so that the combined shape has one line of symmetry. (attempt to draw a kite)

23. (a) List the prime numbers less than 20. $2,3,5,7,11,13,17,19$

(b) A factor tree can be used to write a number as the product of prime factors.



$36 = 2 \times 2 \times 3 \times 3$

(c)Find the Lowest Common Multiple (LCM) of 24 and 36

$24 = 2 \times 2 \times 2 \times 3$ $\quad LCM = 2 \times 2 \times 2 \times 3 \times 3 = 72$

24. An approximate method of deciding how much sleep a young person needs is to subtract their age from 33 and divide by 2.

(e) How much sleep does an eleven year old need? $\frac{33-11}{2}=\frac{22}{2}=11\ hours$

(f) How old is a person who needs 5 hours sleep? $\frac{33-x}{2}=5$

$33-x=(5\times 2)$

$x=23$

(g) How old is the person who needs no sleep at all? (If the formula is correct!)

$\frac{33-x}{2}=0$ $33\ years\ old$

(h) Does it make sense to use the formula for older people? No

25. Nine bus stops are equally spaced along a bus route. The distance from the first to the third is 600 metres. How far is it from the first to the last?



$600\times 4=2400$

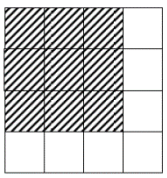
26. When asked how many chickens and cows he had on his farm Mr Brown refused to answer directly, but he did say that the total number of heads was 30 and the total number of legs was 100. How many of each was there?

$Ch+Co=30$ $2Ch+4Co=100$

$2Ch+2Co=60$ $2Co=40$

$20\ Cows$ $10\ Chickens$

27. Inside the large square (of "size 16") a smaller square of "size 9" is shown shaded.



(a) How many different "size 9" squares are there inside the large square? 4

(b) How many different "size 4" squares are there inside the "size 16" square? 9

(c) How many different squares are there in total, taking into account all sizes and positions?

$1+4+9+16=30$