ST ALBANS SCHOOL

13+ Examination 2016

MATHEMATICS

(90 minutes)

This is a non-calculator paper.
There are 14 pages of questions.
Marks may be given for correct working even if the final answer is incorrect.
The mark for each question is shown in square brackets.

Surname	First Name

Date of Birth

Score Total

13+ MATHEMATICS EXAMINATION

INSTRUCTIONS

This is a non-calculator paper. There are 14 pages of questions.

The number in the square brackets shows the marks available for each question

Remember that you should show your methods, as marks may be given for correct working even if the final answer is incorrect.

1) $\frac{3}{4}+1\frac{1}{2}+\frac{1}{3}=$

[2]

2) $2\frac{2}{3}\div 2\frac{2}{9}=$

[3]

Page total $\frac{}{5}$

3) **Use the fact that** $39 \times 32 = 1248$ to write down each of the following:

a) $13 \times 32 =$

[2]

b) $3.9 \times 1.6 =$

[2]

c) $12.48 \div 0.39 =$

[2]

d) $39 \times 40 - 39 \times 8 =$

[2]

Page total $\frac{}{8}$

4)

a) Write 1225 as a product of prime factors

[2]

b) **Use your answer to (a)** to find $\sqrt{1225}$

[2]

Page total $\frac{}{4}$

5)

a) Increase £120 by 35%

[2]

b) Shares originally costing £1500 lose 20% of their value and then gain 10%. What is the final value?

[2]

Page total $\frac{}{4}$

6) Simplify the following:

a) $5x+3y-2x-y=$

[2]

b) $2a^2+3a^2=$

[1]

c) $4a^2b\times 3ab^3=$

[2]

d) $\frac{2abc^2}{6a^2c}=$

[2]

e) $\left(a^2\right)^5=$

[1]

Page total $\frac{}{8}$

7) Solve the following equations:

a) $4x - 2 = -6$

[2]

b) $3(4 + x) = 21$

[2]

c) $7 - x = 12$

[2]

d) $7x - 2 = 25 - 2x$

[2]

e) $\frac{1}{10} - \frac{1}{30} = \frac{1}{x}$

[3]

Page total $\frac{}{11}$

8) Write as a decimal the answer to:

$$8+\frac{8}{10}-\frac{88}{100}$$

[2]

9) A box in the shape of a cube has a volume of $8\,cm^3$
What is the volume of another box whose sides are each twice those of the first one?

[2]

10) If a car uses 30 litres of fuel when travelling 240 km, how much would it use for 400 km?

[3]

Page total $\frac{}{7}$

11) Monty cycles 6 kilometres up a hilly road at a speed of 12 km/h
He then cycles 6 kilometres back down at a speed of 24 km/h

a) For how long was he cycling altogether?
Give your answer in minutes

[2]

b) What was his average speed for the whole journey?
Give your answer in kilometres per hour

[3]

12) In 9 tests so far this year, Sally has an average mark of 61%.
What does she need to score in the 10th test to raise her average to 63%?

[3]

Page total $\frac{}{8}$

13)

a) Find three different integers which add up to +1

[1]

b) Find three non-zero whole numbers which add up to +1 and multiply to give +36

[2]

14) A bag contains red, blue and yellow counters.
If a counter is picked at random, the probability that it is red is $\frac{1}{3}$ and the probability that it is blue is $\frac{1}{4}$
There are 120 red counters in the bag.

a) How many blue ones are there?

[2]

b) How many yellow ones are there?

[2]

Page total $\frac{}{7}$

15) In "old money", before British currency was decimalised, there were 12 pence in 1 shilling and 20 shillings in 1 pound.
Work out one-third of a pound in shillings and pence

[3]

16) A box has length $3x\ cm$, width $2x\ cm$ and height $x\ cm$

The total surface area of the box is $2662\ cm^2$

a) Find an expression for the surface area in terms of x and use it to write down an equation involving x

[3]

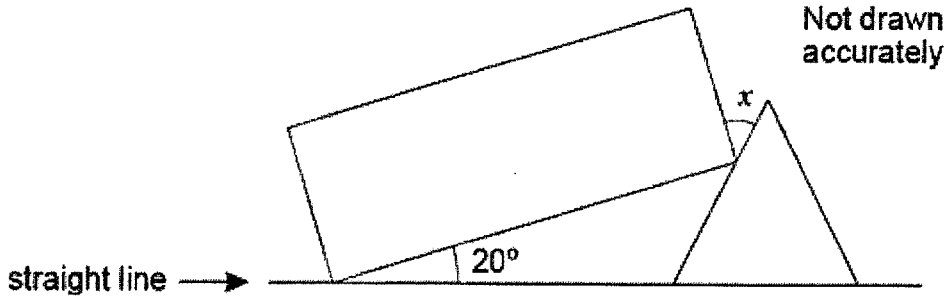
b) Solve your equation to find the length, width and height of the box.

[2]

Page total $\frac{}{8}$

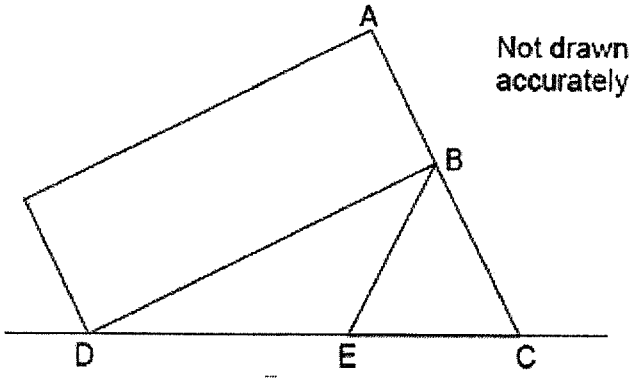
17)

a) The diagram shows a rectangle which just touches an equilateral triangle
Calculate the angle marked *x*.
Show your working



[3]

b) Now the rectangle touches the top of the triangle, so that ABC is a straight line.
Show that triangle BDE is isosceles.



[3]

Page total $\frac{}{6}$

18) The number 6 has four factors: 1, 2, 3, 6

a) How many factors has the number 49? (List them)

[2]

b) How many factors has the number 16? (List them)

[2]

c) Find all the numbers between 1 and 100 which have an odd number of factors. (There are 10 such numbers altogether)

[3]

d) What do you notice about these numbers?

[1]

Page total $\frac{}{8}$

19) Find the next three terms and the n^{th} term in this sequence:
4, 7, 10, 13, ...

[2]

20)

a) The n^{th} term of a sequence is given by the formula $(n-2)(n+2)$
Write down the first five terms

[3]

b) The n^{th} term of another sequence is given by the formula n^2-4
Write down the first five terms

What do you notice about the two sequences?

[3]

c) **Use the pattern** to work out 298×302

[2]

Page total ___/10

21) Purple Fire paint is made by mixing red and blue paint in the ratio 3:1.
Midnight Glow is made by mixing red and blue paint in the ratio 1:3.
By accident, 1 litre of Midnight Glow is mixed into 2 litres of Purple Fire.

a) How much red and how much blue paint is in the resulting mixture? (You might find it easier to work in millilitres)

[3]

b) How much paint, and of which colour, needs to be added to convert the resulting mixture back to Purple Fire?

[3]

Page total $\frac{}{6}$

End of questions

Maximum mark 100