

## **Mathematics Entrance Examination**

**26 April 2019**

- 1. You have 1 hour and 10 minutes for the exam.**
- 2. Answer all questions.**
- 3. No calculators are allowed.**
- 4. Write your answers in the spaces below the questions. Answers with no evidence of calculations will not score any marks. Workings and answers written on any other page will not be marked.**

### **Please note additional requirements:**

- a) You are not allowed to leave during the first 30 minutes or the last 15 minutes of the examination.
- b) If you are left handed or ambidextrous with left hand preference you should inform the invigilator before the start of the exam so that seating arrangements can fit your requirements.
- c) You are not allowed to talk, to whisper, to turn around or to look at another candidate's examination, all of which are offences and you will be penalized. If you commit this offence you will be given a single written warning; after which if you commit a further offence, you will be reported to an assessment board without a right of appeal or refund of the exam administration fee.
- d) No scrap paper may be used. All work must be written in the exam booklet.
- e) You can use non-erasable blue or black pen only. Any answers written in pencil may not be marked.
- f) You cannot use whiteout/correction fluid. If you use this material to correct any of your answers they may not be marked. If you make a mistake, you should simply draw a line through the mistake with pen and continue.
- g) You cannot borrow another student's stationery or materials.
- h) If your pen runs out of ink, you may request a replacement from the invigilator. No other stationery or materials may be provided for you by the invigilator.
- i) If you are found to have any unauthorized exam related materials during the examination this will constitute an offence and you will be disqualified from the exam without a right to claim the reimbursement of the exam administration fee.
- j) If you are caught cheating in the examination, you will be disqualified from the exam without a right to claim the reimbursement of the exam administration fee.
- k) Failure to show contents of your pockets or any other containers to the invigilators will be considered as an offence and you will be disqualified from the exam with no right of appeal or refund of the fee.
- l) All mobile phones and other electronic devices must be switched off and left at a place indicated by the invigilators. If you are found to have a mobile phone or other electronic device (switched on or off) on you during the exam, this will be considered as unauthorised examination materials and you will be disqualified from the exam without a right of appeal or refund of the fee.

**Applicant ID:**

All questions on this paper must be answered.

Write the answers in the space below each question.

Show **ALL** working for each question.

1. Work out the following and give your answers in their simplest form  
*(Give answers as mixed answers where appropriate)*

a)  $2\frac{1}{3} \times 1\frac{3}{8}$

.....

(2 marks)

b)  $1\frac{3}{5} \div \frac{6}{7}$

.....

(2 marks)

c)  $\frac{7}{9} - \frac{1}{6}$

.....

(2 marks)

**(Total for page: 6 marks)**

2.a) Anna, Kaelanne and Pablo each earn the same monthly salary.

Each month Anna saves 28% of her salary and spends the rest.

Kaelanne spends  $\frac{3}{4}$  of her salary and saves the rest.

The amount of money Pablo saves and the amount he spends is in the ratio 3:7.

Work out who saves most of their salary each month.

.....

(2 marks)

b) On a farm

the number of sheep and the number of cows are in the ratio 7:4

the number of cows and the number of pigs are in the ratio 8:5

There are 50 pigs on the farm.

How many sheep are there on the farm?



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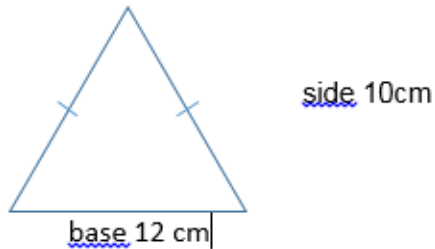
(3 marks)

**Total marks for page:5 marks**

3. An isosceles triangle has a base of 12cms and sides of length 10cms.

What is the height of the triangle?

**NOT DRAWN TO SCALE**



.....  
(3 marks)

4. Ana bought a mobile phone in the United States of America.

Ana paid \$108.

Sylvan bought an identical (same) phone in Germany and paid €117.



The exchange rates are

$$£1 = \$1.44$$

$$£1 = €1.15$$

Calculate in pounds (£), the difference between the prices paid for the two phones.

Round your final answer to the nearest 1 pence (2 decimal places).

.....(4 marks)

**(Total for page: 7 marks)**

5. a) Find the next two numbers in the sequence 2, 8, 18, 32, \_\_, \_\_

.....

(2 marks)

b) Find the  $n$ th term of the sequence -2, 2, 6, 10

.....

(2 marks)

c) Sasha says that the number 324 is a number in this sequence,

Is she right?

You must give a reason for your answer.

.....  
.....  
.....  
.....  
.....

(1 mark)

**(Total for page: 5 marks)**

6. a) Make  $a$  the subject of  $a + 3 = \frac{2a + 7}{r}$

.....  
(3 marks)

b) Find  $x$  where

$$\frac{x}{2} - 3 = \frac{x}{4}$$

.....  
(2 marks)

c) Solve this pair of simultaneous equations.

$$\begin{aligned} 7x - 6y &= 17 \\ 3y + 2x &= 19 \end{aligned}$$

.....  
(4 marks)

**(Total for page: 9 marks)**

7. a) Factorise

$$12y^2 - 20y + 3$$

.....

(2 marks)

b) Simplify

$$\frac{2x^2 - 8}{x^2 + 6x + 8}$$

.....

(3 marks)

**Total for page: 5 marks**

8. It would take 4 hours to fill an aquarium using water from 10 taps.  
How many hours and minutes would it take if only 6 taps were used?



.....  
(3 marks)

9. Buses to Manchester leave London Victoria bus station every 24 minutes.  
Buses to Birmingham leave the same bus station every 20 minutes.

A bus to Manchester and a bus to Birmingham both leave the station at 09.00.

When will a bus to Manchester and a bus to Birmingham next leave the bus station at the same time?

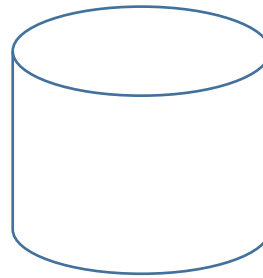
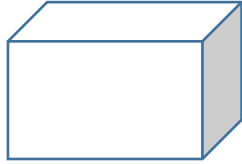


.....  
(2 marks)

**(Total marks for page: 5 marks)**



10. A cylindrical tin of height 15 cm and radius 4 cm is filled with sand from a rectangular box. How many times can the tin be filled if the dimensions of the box are 50 cm by 40 cm by 20 cm? Use 3.14 as the value of  $\pi$ .  
**Give your answer to the nearest whole number.**



***Diagram not drawn to scale***

.....  
(5 marks)

**Total marks for page:5 marks**

11. a) Draw the curve of  $x^2 + y^2 = 25$  (2 marks)

b) Use the same axes and draw the line of  $3x + 2y - 5 = 0$  (2 marks)

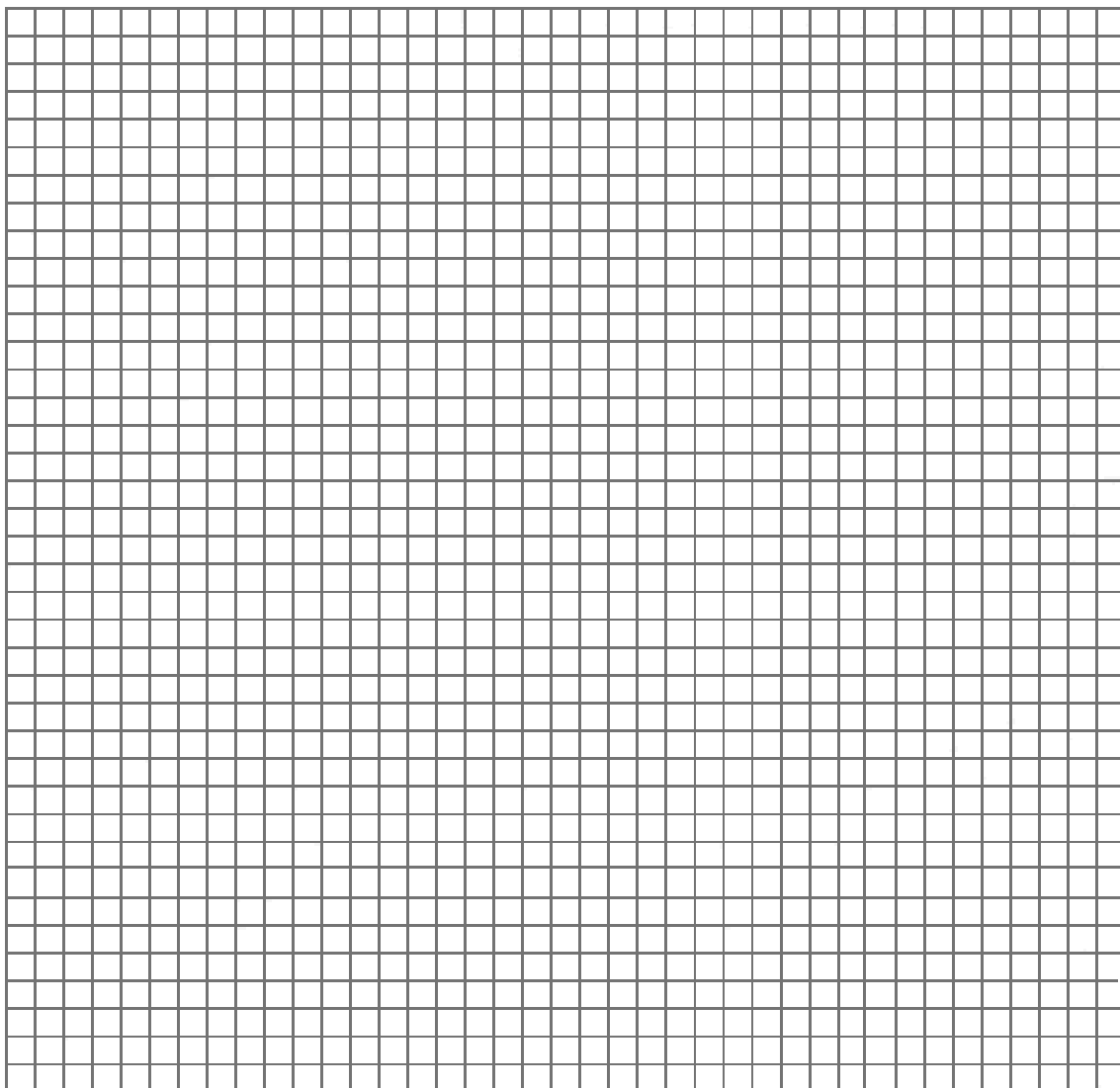
c) From the graph, find the values of  $x$  and  $y$  that satisfy both of the equations

$$x^2 + y^2 = 25 \text{ and}$$

$$3x + 2y - 5 = 0$$

$$x = \dots\dots\dots y = \dots\dots\dots (2)$$

$$x = \dots\dots\dots y = \dots\dots\dots (2)$$



**Total for page: 8 marks**

12.

$$-5 < y \leq 0$$

where  $y$  is an integer (whole number)

- a) Write down all the possible values of  $y$

.....

(2 marks)

- b) Find the largest prime number  $p$  such that  $p^2 < 400$

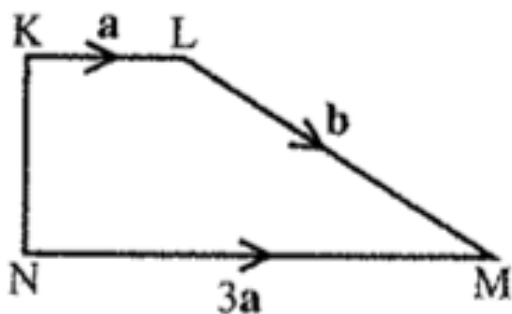
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(2 marks)

**(Total for page: 4 marks)**

13.

Write each of the following vectors in terms of **a**, **b**, or **a** and **b**

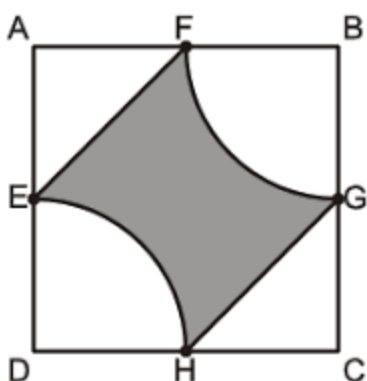


- a)  $\overrightarrow{MK}$  ..... 1 mark
- b)  $\overrightarrow{NL}$  ..... 2 marks
- c)  $\overrightarrow{NK}$  ..... 2 marks
- d)  $\overrightarrow{KN}$  ..... 1 mark

14. The square ABCD below is 12 cm x 12 cm, where EFGH are the mid-points of each side.

Find the area of the shaded section. Use 3.14 as the value of  $\pi$

Give your answer to the nearest whole number.



*Diagram not drawn to scale*

.....cm<sup>2</sup>

(5 marks)

**Total marks for page: 11 marks**

**END OF TEST  
DO NOT WRITE ON THIS  
PAGE**