



FOUNDED 1900

THE ENGLISH SCHOOL
A SECOND CENTURY OF EXCELLENCE

YEAR 4 MID-PROGRAMME ENTRY EXAMINATIONS 2016

MATHEMATICS

SATURDAY 4th JUNE 2016

Time allowed: 2 hours

Instructions to candidates

Answer the questions in the spaces provided.
Without sufficient working, correct answers may be awarded no marks.

Information to candidates

This paper has 25 questions.
There are 16 pages in this question paper.
Full marks may be obtained for answers to all questions.
The total mark for this paper is 120.
The marks for each question is shown in round brackets, e.g. (2)
Calculators may be used.

Advice for candidates

Write your answers neatly and in good English.
Work steadily through the paper.
Do not spend too long on one question.
Show all stages in any calculations.

Materials required for the paper

Calculator, ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. Tracing paper may be used.

1. The number 10^{190} is called a STAR. Write the number 45 STARS in standard form.

Answer..... (1)

2. Calculate the value of $7.2 \times 10^4 + 15.5 \times 10^4$, giving your answer in standard form.

Answer..... (1)

3. Simplify the following expressions.

(a) $5pq + 7pq^2 + 3pq - 2pq^2$

Answer..... (2)

(b) $5b^2 \times (2b)^3 \times a^2$

Answer..... (3)

4. Given the sequence 2, 5, 8, 11, ...

(a) Write down the next two terms.

Answer, (2)

(b) Find a formula for the n^{th} term in terms of n .

$u_n = \dots\dots\dots$ (2)

5. In 2008 the population of Cyprus was 792 604 and the population growth rate 0.522% per year. Calculate giving your answers to the nearest unit:

(a) The expected population for 2009?

Answer..... (2)

(b) The expected population for 2020?

Answer..... (3)

6. Carlos mixes cement, lime and sand in the ratio 1 : 5 : 11.
Work out the weight of cement, lime and sand in 68 kg of the mixture.

cement kg
lime kg
sand kg

(3)

7. Simplify the following expressions fully:

a) $3(15x - 10) - 2(9x - 12)$

Answer..... (3)

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

Answer..... (3)

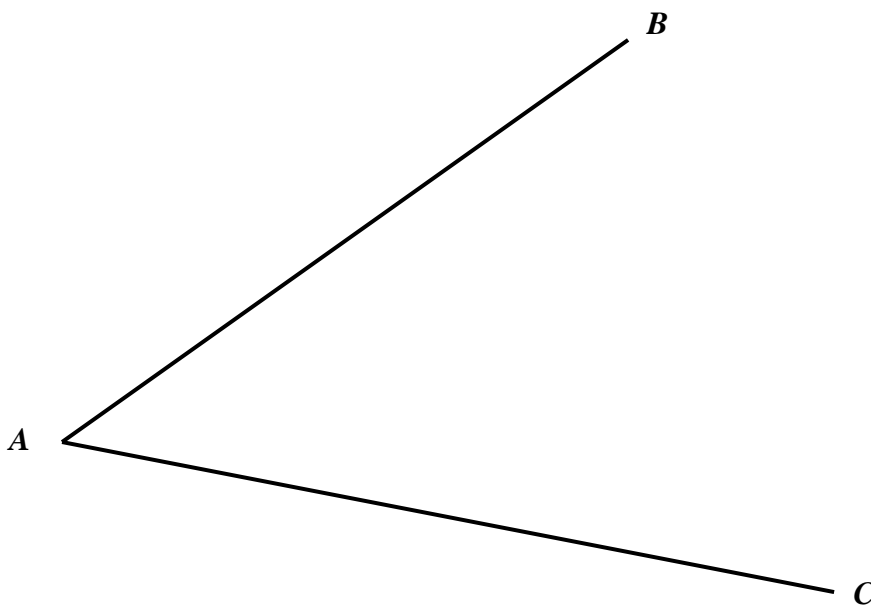
c) $6ab^3 - 2ab^2 + 3b^2a - 3b^3a$

Answer..... (2)

d) $\frac{1}{x} + 2 + \frac{3}{2x}$

Answer..... (3)

8. Use a ruler and a pair of compasses to bisect the angle $\angle BAC$. You must show all construction lines.



(2)

9. Solve the following equations. Leave your answers as mixed numbers where appropriate.

(a) $2x - 3 = 6$

Answer..... (2)

(b) $x^2 + 2x - 15 = 0$

Answers..... (3)

(c) $\frac{2x-1}{3} - \frac{x}{4} = 2$

Answers..... (3)

(d) $x(x + 2) = 120$

Answer..... (4)

10. Without using a calculator convert the recurring decimal $0.\dot{5}$ to a fraction. Show all your working out.

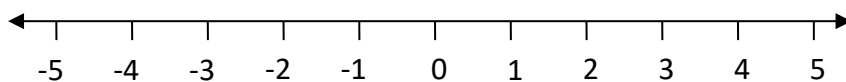
Answer..... (3)

11.

- (a) Find the values of x which satisfy the inequality $x + 14 > 3x + 10$.

Answer..... (3)

- (b) Show the inequality on a number line.



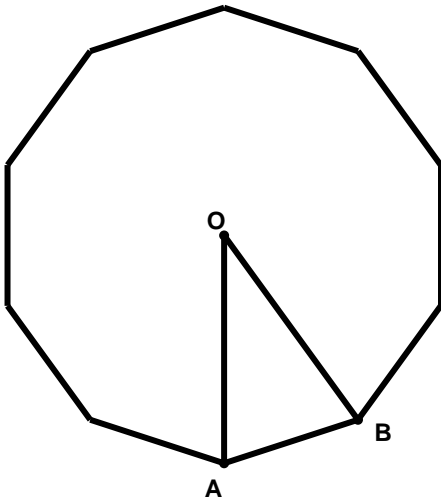
(1)

- (c) If x is a whole number. Write down the largest value of x that satisfies $x + 14 > 3x + 10$.

Answer..... (1)

12.

- (a) The diagram shows a regular decagon, with centre O . Work out the value of the angle OAB .



Answer..... (2)

- (b) A regular polygon has an exterior angle of 30° . Work out the number of sides of the polygon.

Answer..... (2)

13. Solve the following simultaneous equations.

$$3x - 7y = 10$$

$$x + y = 0$$

Answer..... (4)

14. Jo uses the formula $F = \frac{9}{5}C + 32$ to change degrees Celsius (C) to degrees Fahrenheit (F).

(a) Use this formula to find the value of F when $C = 40$

Answer..... (2)

(b) Rearrange the formula to make C the subject of the formula.

Answer..... (3)

15.

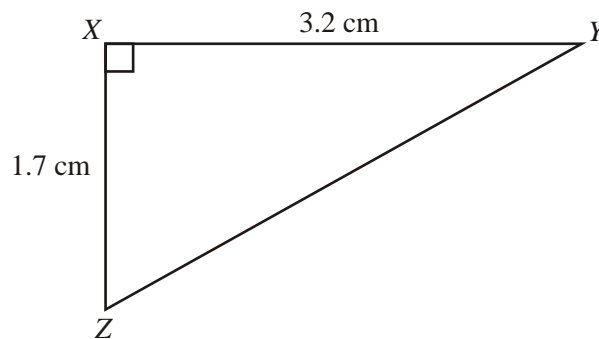


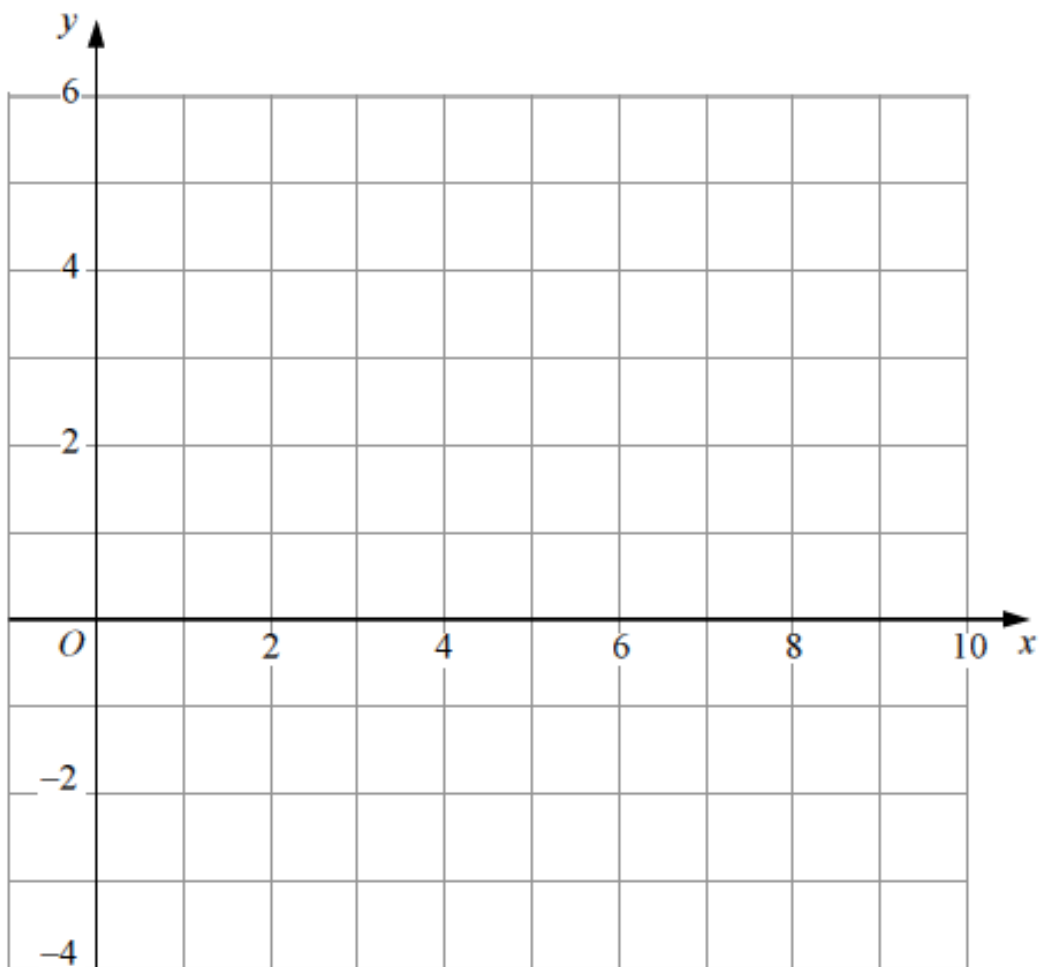
Diagram NOT accurately drawn

XYZ is a right-angled triangle. $XY = 3.2$ cm and $XZ = 1.7$ cm.
Calculate the length of YZ . Give your answer correct to 3 significant figures.

Answer..... (4)

16. On the grid, shade the region that satisfies all three of the following inequalities

$$y \geq 0, x \geq 3, y < x - 2$$



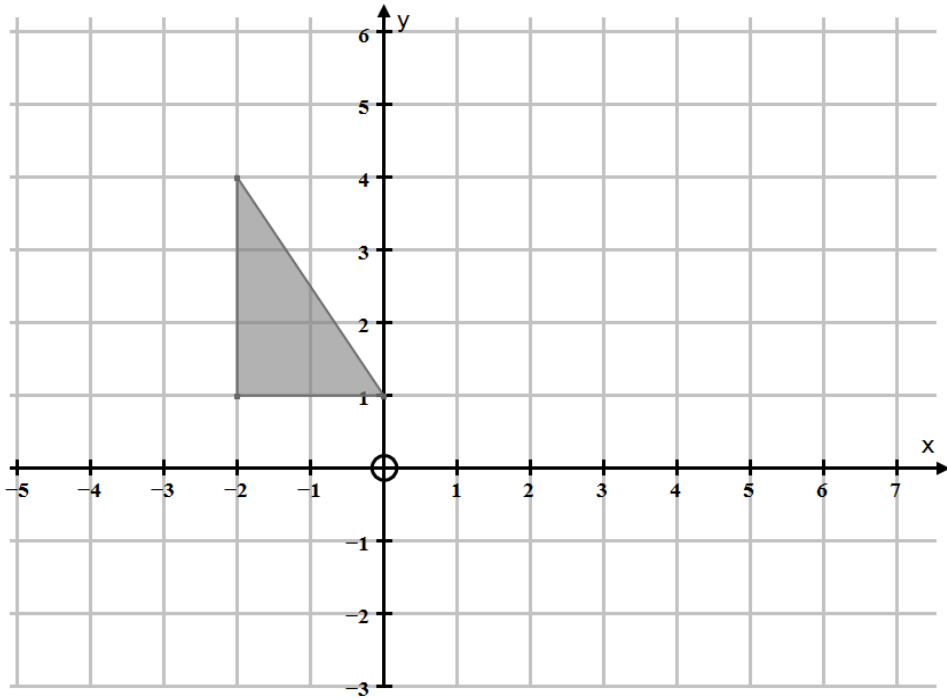
(4)

17. Janice asks 100 students if they like biology or chemistry or physics best. 38 of the students are girls. 21 of these girls like biology best. 18 boys like physics best. 7 out of the 23 students who like chemistry best are girls. Work out the number of students who like biology best.

Answer..... (3)

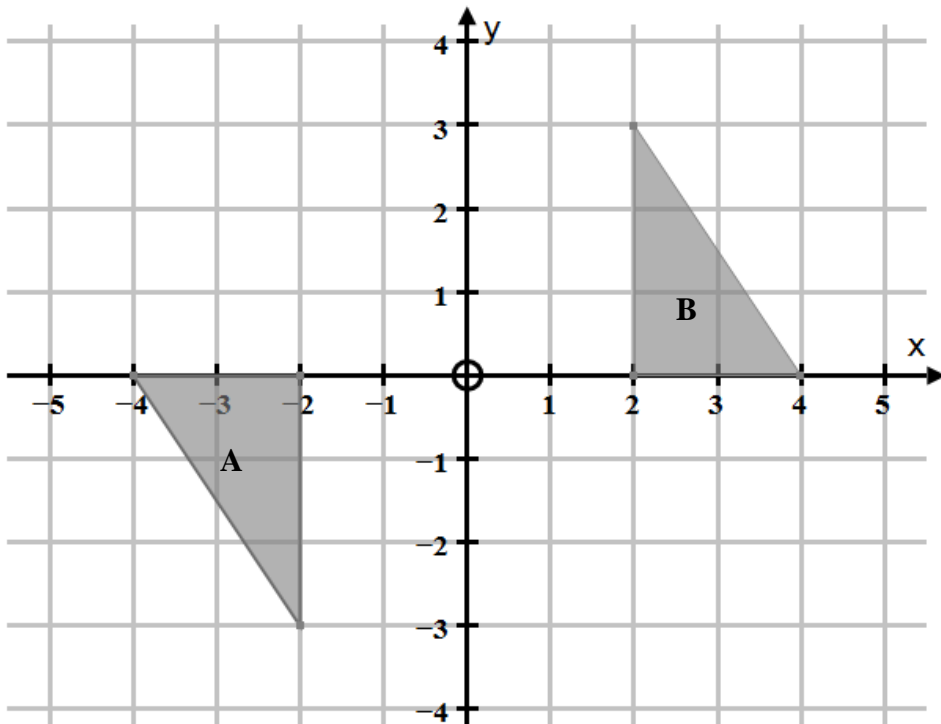
18.

- (a) Translate the triangle below by the vector $\begin{pmatrix} 5 \\ -3 \end{pmatrix}$.



(2)

- (b) Describe fully the single transformation that maps triangle A onto triangle B.



.....
.....

(3)

19. Charles found out the length of reign of each of 41 kings. He used the information to complete the frequency table.

Length of reign (L years)	Number of kings	C.F	Mid-Point
$0 < L \leq 10$	14		
$10 < L \leq 20$	13		
$20 < L \leq 30$	8		
$30 < L \leq 40$	4		
$40 < L \leq 50$	2		

- (a) Write down the class interval that contains the median.

.....

(2)

- (b) Calculate an estimate for the mean length of reign.

..... years

(5)

20.

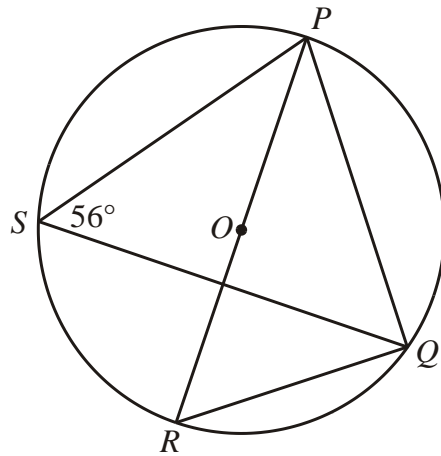


Diagram **NOT** accurately drawn

P, Q, R and S are points on the circumference of a circle, centre O .
 PR is a diameter of the circle.
Angle $PSQ = 56^\circ$.

(a) Find the size of angle PQR .
Give a reason for your answer.

.....^o (2)

(b) Find the size of angle PRQ .
Give a reason for your answer.

.....^o (2)

(c) Find the size of angle POQ .
Give a reason for your answer.

.....^o (2)

21. The density (ρ) of an object is calculated using the formula

$$\rho = \frac{m}{V}$$

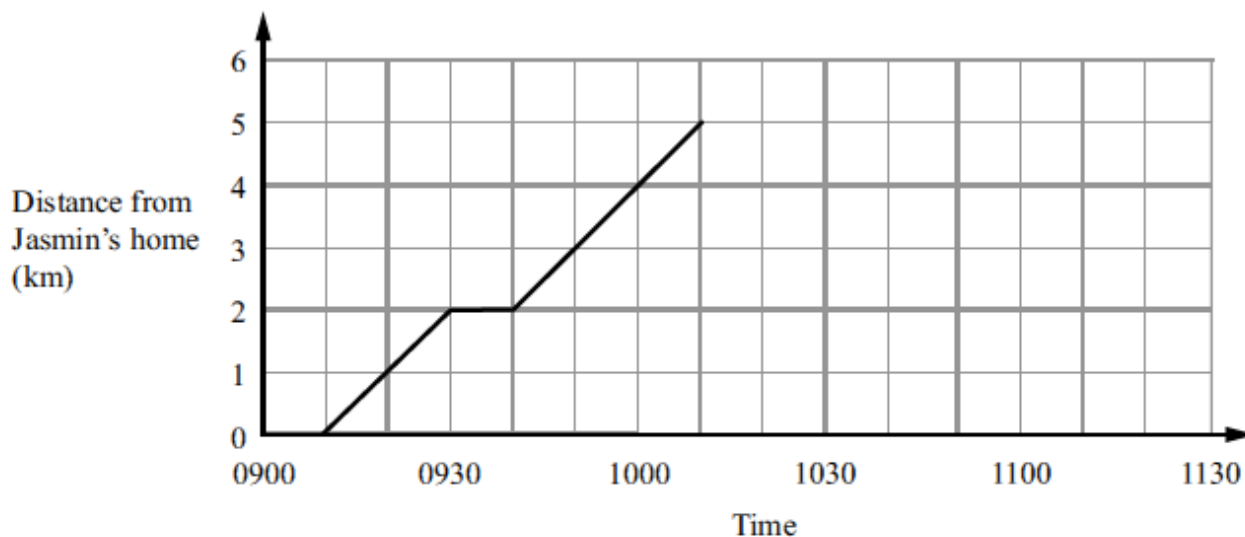
where m is the mass in kg and V is the volume in m^3 .

The mass of a solid shape is 6460 kg correct to 3 significant figures. The volume of the solid shape is 2.8 m^3 correct to 2 significant figures.

Calculate, correct to 4 significant figures the lower bound of the density.

Answer..... (3)

22. Jasmin walked from her home to the park. Here is a travel graph for Jasmin's journey from her home to the park.



(a) For how long did she stop? Give your answer in minutes.

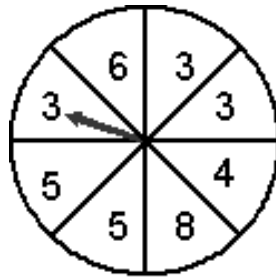
Answer..... (2)

Jasmin stayed at the park for half an hour. She then walked home at a speed of 7.5 km/h.

(b) Complete the travel graph.

(3)

23. The diagram shows a pointer which spins about the centre of a fixed disc.



NOT TO SCALE

When the pointer is spun, it stops on one of the numbers 3, 4, 5, 6 or 8. The probability that it will stop on one of the numbers is given in the table below.

Number	3	4	5	6	8
Probability	0.38	0.14		0.12	0.11

Beckham is going to spin the pointer once.

- (a) Work out the probability that the pointer will stop on 5.

Answer..... (2)

- (b) Work out the probability that the pointer will stop on a prime number.

Answer..... (2)

Frank is going to spin the pointer 125 times.

- (c) Work out an estimate for the number of times the pointer will stop on 8.

Answer..... (2)

24. The length of a rectangle is twice as long as the width of the rectangle. Its perimeter is 36 metres. Let the width of the rectangle be x . **Form an equation** and solve it to find:

a) the length and the width of the rectangle.

Length=.....

Width=..... (5)

b) the area of the rectangle.

Area=..... (1)

25.

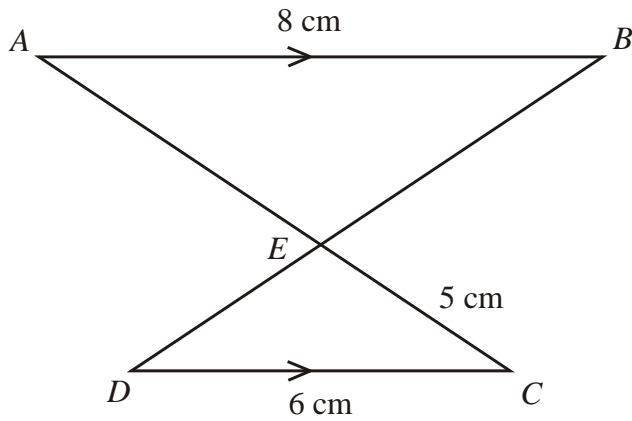


Diagram **NOT** accurately drawn

AB is parallel to DC .

The lines AC and BD intersect at E .

$AB = 8$ cm $EC = 5$ cm $DC = 6$ cm

(a) Explain why triangle ABE and triangle CDE are similar.

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

(3)

(b) Calculate the length of AC giving your answer correct to 2 decimal places.

length of $AC =$ cm

(3)

End of paper