



FOUNDED 1900

THE ENGLISH SCHOOL
A SECOND CENTURY OF EXCELLENCE

END-OF-YEAR-EXAMINATIONS

YEAR 2 MATHEMATICS MATHS FRAMEWORKING BOOKS 2.3 & 3.3

Time allowed: 2 hours

Instructions to candidates

In the boxes below write your name, surname and form.
Answer the questions in the spaces provided.
Without sufficient working, correct answers may be awarded no marks.

Information to candidates

This paper has 22 questions.
There are 15 pages in this question paper.
Full marks may be obtained for answers to all questions.
The total marks 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

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

1. Write each expression as a single fraction simplifying your answer completely:

(a) $\frac{2x+3}{2} - \frac{2x}{5}$

.....
(3)

(b) $\frac{2x+3}{2} \div \frac{3}{4}$

.....
(3)

2.

(a) Work out the missing expression in the calculation below giving your answer in a simplified form:

$$\text{.....} + \frac{3}{4} = \frac{2x+6}{8}$$

.....
(2)

(b) Simplify the algebraic fractions below:

(i) $\frac{6x+4}{15x+10}$

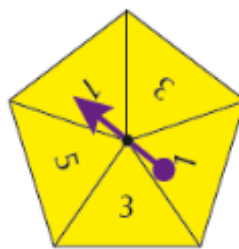
.....
(3)

(ii) $\frac{3a}{2} \div \frac{7a}{6}$

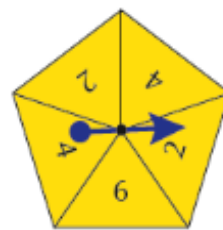
.....
(2)

3. Ben spins the two fair, five-sided spinners shown below. He records the **product** of their scores.
 (a) Complete the sample space diagram shown below to show all possible outcomes:

		Number on the spinner				
Number on the spinner 1						



spinner 1



spinner 2

- (b) Work out each of the probabilities shown below, showing all your calculations and simplifying your answers:

(i) $P(\text{score of } 12) =$

(ii) $P(\text{score is less than } 12) =$

(iii) $P(\text{score is not } 12) =$

.....

.....

.....

(2)

(3)

Ben now spins **spinner 1**. The number of times of landing on number 5 and the relative frequencies of the number of times a spinner lands on **number 5** are shown in the incomplete table below.

- (c) (i) Complete the table

Number of spins	10	20	50	75	100
Number of times of landing on number 5	4	6		18	22
Relative frequency of landing on number 5	0.4		0.26	0.24	0.22

(1)

- (ii) Write down the best estimate of the number of times the spinner would land on **number 5** in 600 spins.

.....

(1)

4.

- (a) The number of employees in a certain company changes from 414 to 470. Work out the percentage increase giving your answer correct to three significant figures.

Percentage increase =
(2)

- (b) In 2016, the population of Tokyo was 37,832,886. If there was an increase of 4% from 2010, find the population in 2010.

Population in 2010 =
(2)

- (c) Barbara put \$12,500 in a savings account. At the end of the first year she earned interest of 2.4% but she left this in her account. At the end of the second year she was paid interest of 2.5%. How much interest did she receive at the end of the second year?

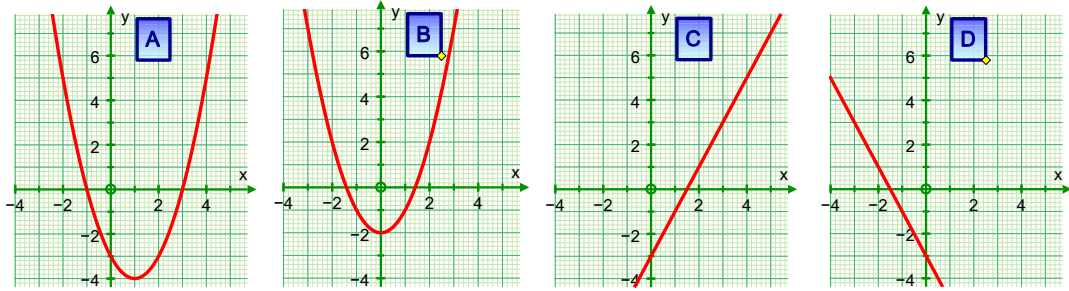
Interest =
(3)

-
5. The density of steel is 7700 kg/m^3 . A block of steel has a mass of 154 kg. Work out the volume of the block in m^3 .

..... m^3
(2)

6.

- (a) Match each of the graphs A, B, C and D shown below to only one of the equations shown below (I, II, III, IV, V or VI):



Equation:

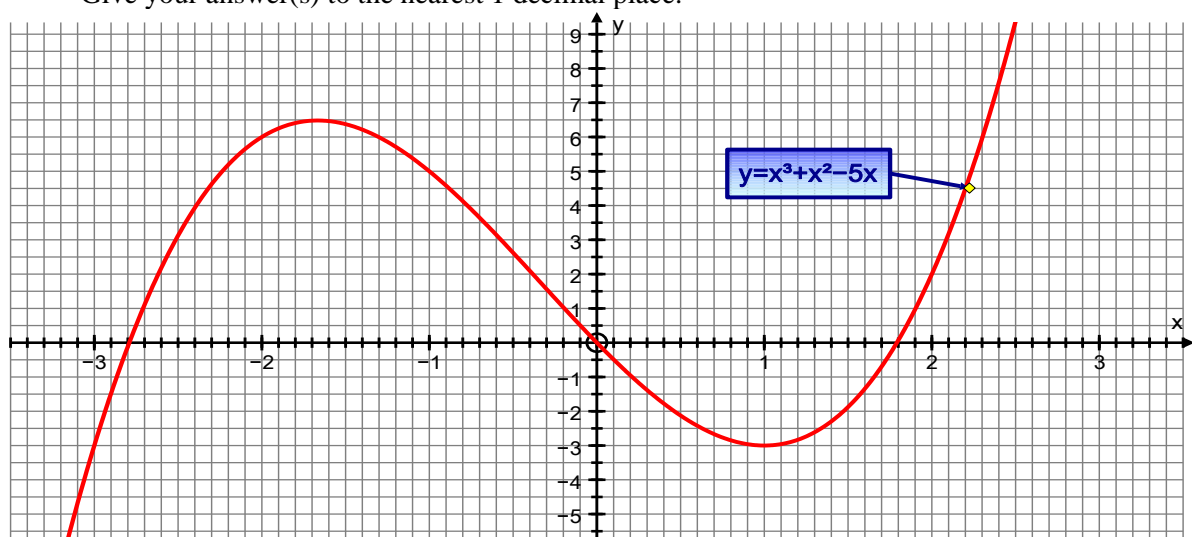
- I: $y = x^2 - 2x - 3$, II: $y - 2x + 3 = 0$ III: $y = -x^2 - 2$ IV: $y = 3x - 2$ V: $y = -2x - 3$ VI: $y = x^2 - 2$ (4)

- (b) Find the equation of the straight line passing through the point (1, 2) with gradient -3

(3)

Equation:

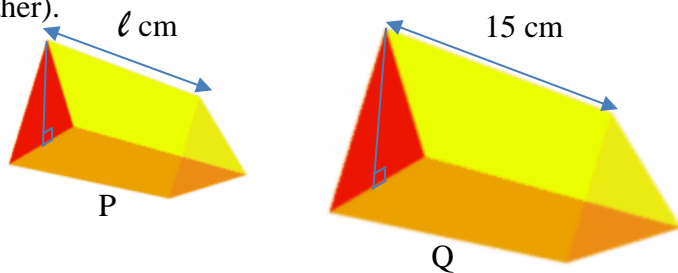
- (c) The graph of the equation $y = x^3 + x^2 - 5x$ is shown below:
By drawing an appropriate straight line, find the solution(s) of the equation $x^3 + x^2 - 5x = 2$.
Give your answer(s) to the nearest 1 decimal place.



(3)

$x =$

7. The two triangular prisms P and Q shown below, are similar (they are enlargements of each other).



The area of the cross section of prism Q is 27 cm^2 and the area of the cross section of prism P is 12 cm^2 . The length of prism Q is 15 cm. Work out:

- (a) the ratio of area of cylinder P to cylinder Q giving your answer in a simplified form.

..... : (2)

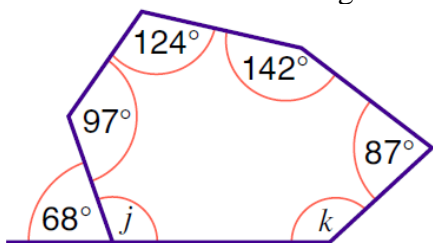
- (b) the length l of prism P.

$l = \dots\dots\dots \text{cm}$ (2)

- (c) the volume of prism Q.

..... cm^3 (2)

8. Calculate the size of the angles labelled j and k in the polygon shown below.



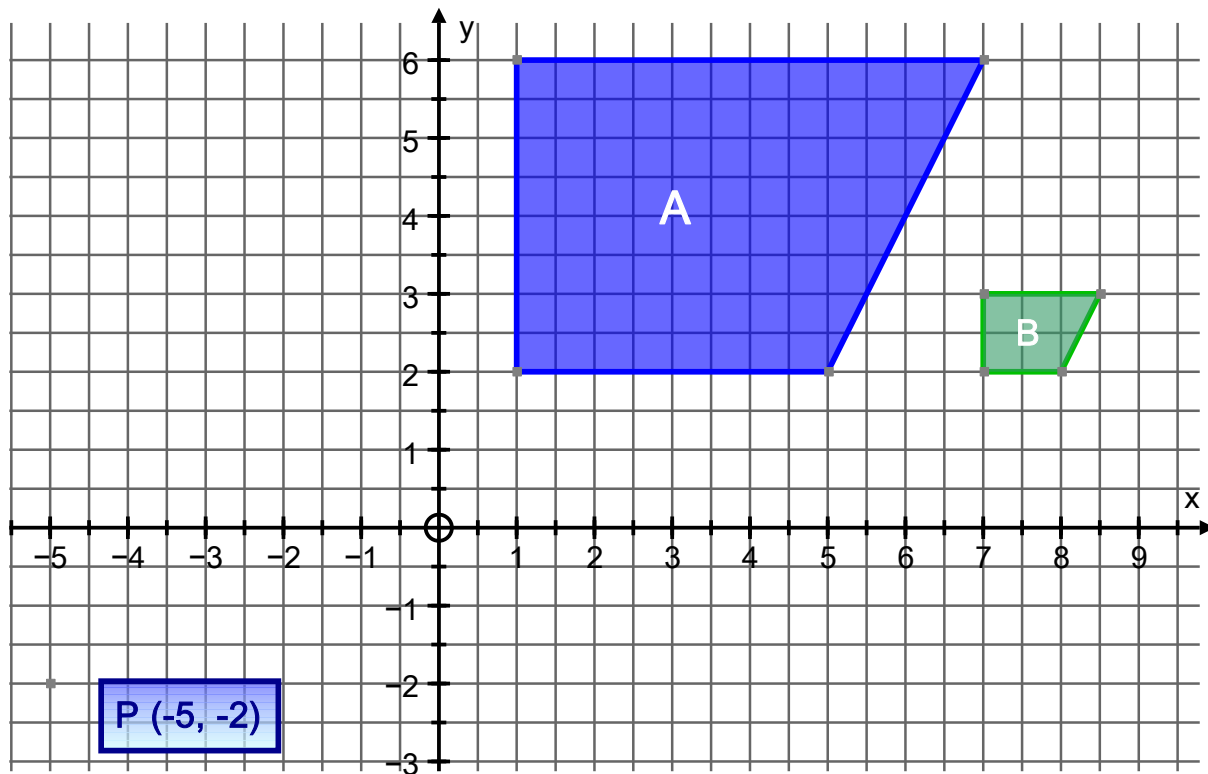
$j = \dots\dots\dots^\circ, k = \dots\dots\dots^\circ$
(4)

9. In the diagram shown below, shape B is an enlargement of shape A.

(a) What is the scale factor of the enlargement? (1)

(b) Work out the coordinates of the centre of enlargement by drawing rays on your diagram. (.....,.....) (1)

(c) Enlarge shape A by a scale factor of $\frac{1}{2}$ about point P(-5, -2). Label this image C. (2)



10.

(a) Fully factorise each of the following:

(i) $18k^2 - 27k$

..... (2)

(ii) $x^2 + 14x + 49$

..... (2)

(iii) $2x^2 - 72$

..... (2)

(b) Find the missing numbers in the factorization shown below

$x^2 + 12x + \dots = (x + 5)(x + \dots)$

(2)

11. The table shows values of p and q.

p	16	12
q	1.2	?

a) If p is directly proportional to q, work out a formula connecting p and q.

.....(2)

b) If p is inversely proportional to q, work out,

i) the missing value of q

.....(2)

ii) a formula connecting p and q.

.....(2)

12. The cost of a 400g packet of minced beef is €8.80. As an exclusive offer, two packets cost only €14.08. Find the reduction in the cost per 100 g.

€.....

(3)

13.

(a) Solve the following equations:

(i) $(w-3)^2 = 25$

$w = \dots\dots\dots$
(3)

(ii) $\frac{5}{x-3} = \frac{12}{x+4}$

$x = \dots\dots\dots$
(3)

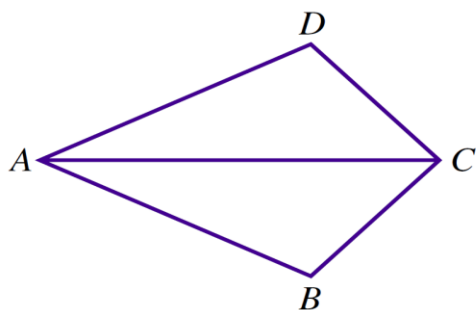
(b) Rearrange the formula shown below to make a the subject of the formula simplifying your answer. $3x = y(5w - az)$

$a = \dots\dots\dots$
(3)

14. A rectangle is 18cm long and 14 cm wide, both measured to the nearest centimetre. What are the upper and lower bounds of the **area** of the rectangle? (*show all your calculations*)

Lower bound of the area is cm² Upper bound of the area is cm².
(4)

-
15. In a quadrilateral ABCD, $AB = AD$, and AC bisects angle BAD.
(a) **Prove** that triangles ABC and ADC are **congruent**.



- (b) Hence, show that AC bisects angle BCD.

(1)

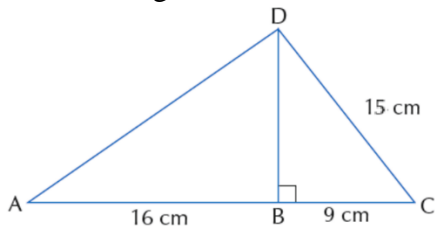
16. The speed of light is 299,792,458 m/s. If it takes about 8 minutes and 17 seconds for sunlight to travel the average distance from the surface of the Sun to the Earth, find
- (a) the average distance from the surface of the Sun to the Earth, giving your answer to the nearest km. (show all your calculations)

.....km
(3)

- (b) the average distance from the surface of the Sun to the Earth, in km, giving your answer in standard form, correct to 3 significant figures.

.....km
(2)

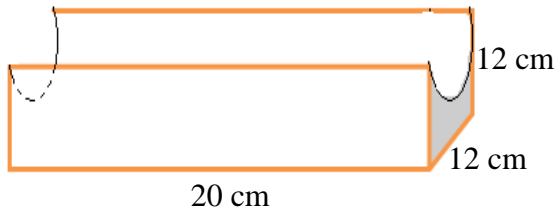
17. Given that triangles ABD and CBD are right angle triangles
- (a) Find the length of the side BD of the triangle BCD.
- (b) Find the length of the side AD of the triangle ACD.



$BD = \dots\dots\dots$ cm

$AD = \dots\dots\dots$ cm
(4)

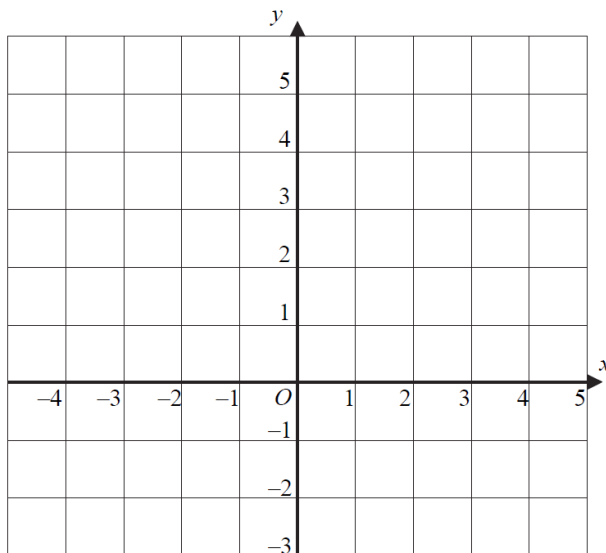
18. This composite shape shown below, is made from a cuboid after a half-cylinder is removed from it. Calculate the volume of the shape. (Use $\pi = 3.142$ or the π key on your calculator and give your answer correct to three significant figures.)



Volume =cm³
(4)

19. (a) Complete the table and on the grid below, draw the line $x + y = 4$.

(2)



x				
y				

- (b) Write down the coordinates of the point of intersection of the above line with the straight line $x = -1$

.....
(1)

20. AB is parallel to DE. ACE and BCD are straight lines.
 AB = 10 cm, BC = 7 cm, DE = 6 cm, CE = 3 cm.
 (a) Using similar triangles, calculate the length of AC.

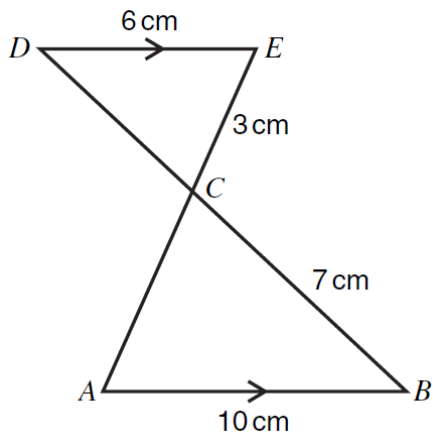


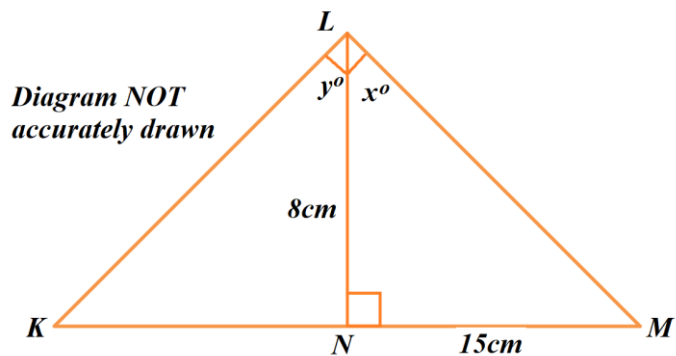
Diagram **NOT** accurately drawn

- (b) Calculate the length of BD.

.....cm
 (2)

.....cm
 (3)

21. The diagram shows a triangle LMN .
 $MN = 15$ cm. $LN = 8$ cm. Angle $LMN = 90^\circ$
 and angle $KLM = 90^\circ$.
 Angle $NLM = x^\circ$ and angle $KLN = y^\circ$



- (a) Calculate the value of angles x and y .
 Give your answer correct to one decimal place.

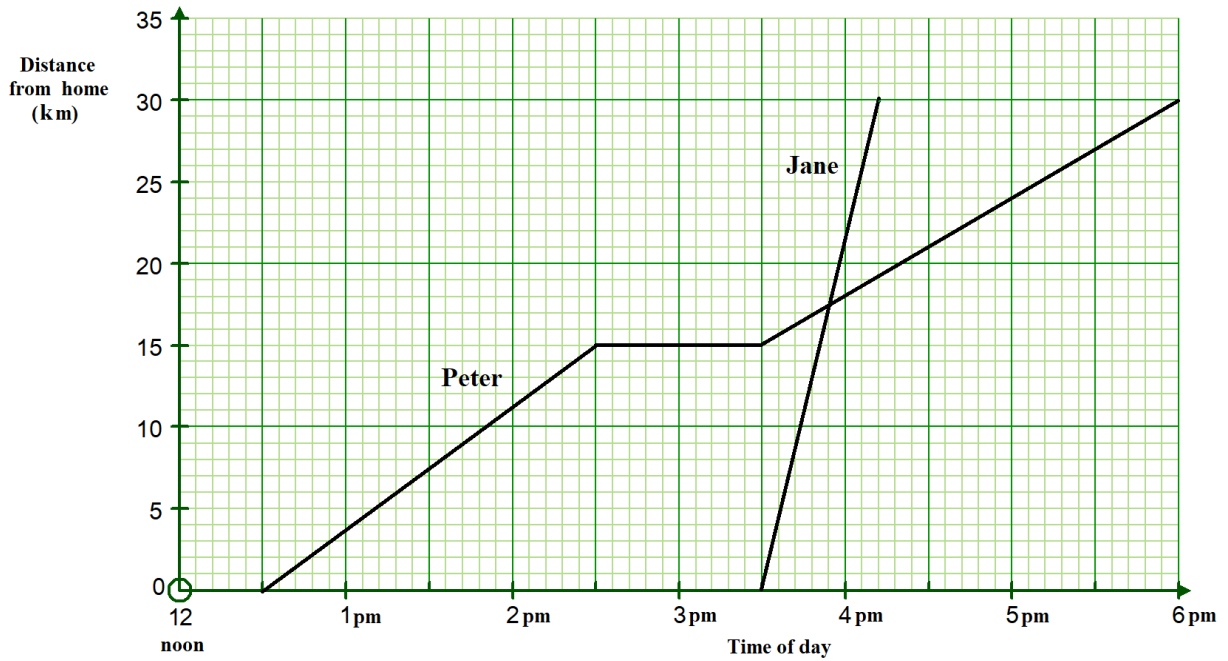
$$x = \dots\dots\dots^\circ, \quad y = \dots\dots\dots^\circ$$

(2)

- (b) Find the area of the triangle KLM , (give your answer correct to 3 significant figures).

..... cm^2
 (3)

22. Peter and Jane go to the seaside, a distance of 30 kilometres from their home. Peter leaves home on his bicycle at 12:30 pm. Jane leaves later on her scooter.



- (a) Peter takes a break on his journey.
- (i) For how long does Peter take a break? (1)
- (ii) How far from the seaside is he when he takes his break? (1)
- (b) At what time does Jane leave home? (1)
- (c) Estimate the time at which Jane passes Peter. (1)
- (d) Approximately, how many minutes before Peter does Jane arrive at the seaside? (1)
- (e) Estimate Jane's speed giving your answer to the nearest km/h.

..... km/h

(2)

End of paper