

14 The function f is such that

$$f(x) = \frac{3x - 5}{4}$$

(a) Find $f(-7)$

.....
(1)

(b) Express the inverse function f^{-1} in the form $f^{-1}(x) = \dots$

$$f^{-1}(x) = \dots\dots\dots$$

(2)

The function g is such that

$$g(x) = \sqrt{19 - x}$$

(c) Find $fg(3)$

.....
(2)

(d) Which values of x cannot be included in any domain of g ?

.....
(2)

(Total for Question 14 is 7 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



15 (a) Simplify fully $\left(\frac{256x^{20}}{y^8}\right)^{\frac{1}{4}}$

.....
(2)

(b) Express $\frac{1}{9x^2 - 25} - \frac{1}{6x + 10}$ as a single fraction in its simplest form.

.....
(3)

(Total for Question 15 is 5 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



- 16 A frustum is made by removing a small cone from a large cone.
The cones are mathematically similar.

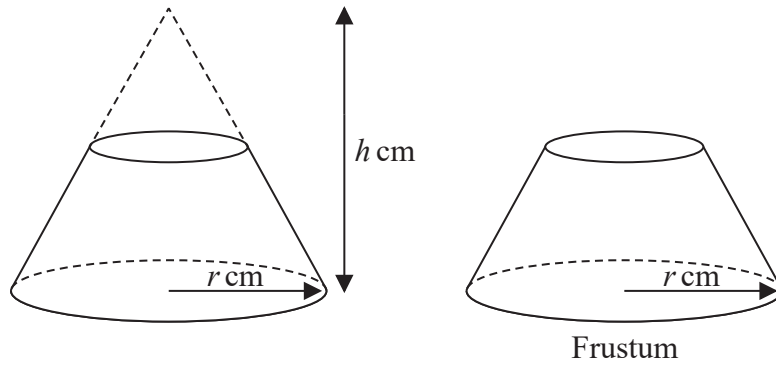


Diagram **NOT** accurately drawn

The large cone has base radius r cm and height h cm.

Given that

$$\frac{\text{volume of frustum}}{\text{volume of large cone}} = \frac{98}{125}$$

find an expression, in terms of h , for the height of the frustum.

..... cm

(Total for Question 16 is 4 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



17 The diagram shows parallelogram $ABCD$.

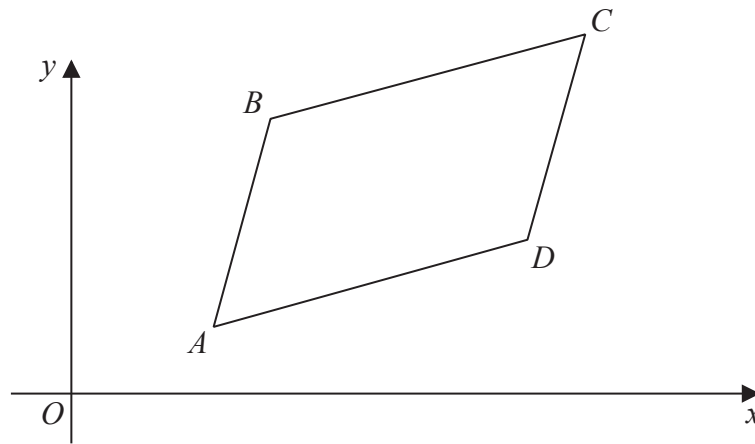


Diagram **NOT** accurately drawn

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

$$\vec{AB} = \begin{pmatrix} 2 \\ 7 \end{pmatrix} \quad \vec{AC} = \begin{pmatrix} 10 \\ 11 \end{pmatrix}$$

The point B has coordinates $(5, 8)$

(a) Work out the coordinates of the point C .

(.....,)
(3)

The point E has coordinates $(63, 211)$

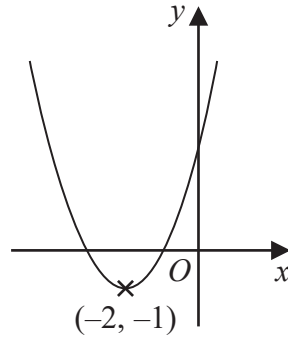
(b) Use a vector method to prove that ABE is a straight line.

(2)

(Total for Question 17 is 5 marks)



18



The diagram shows the curve with equation $y = f(x)$
 The coordinates of the minimum point of the curve are $(-2, -1)$

(a) Write down the coordinates of the minimum point of the curve with equation

(i) $y = f(x - 5)$

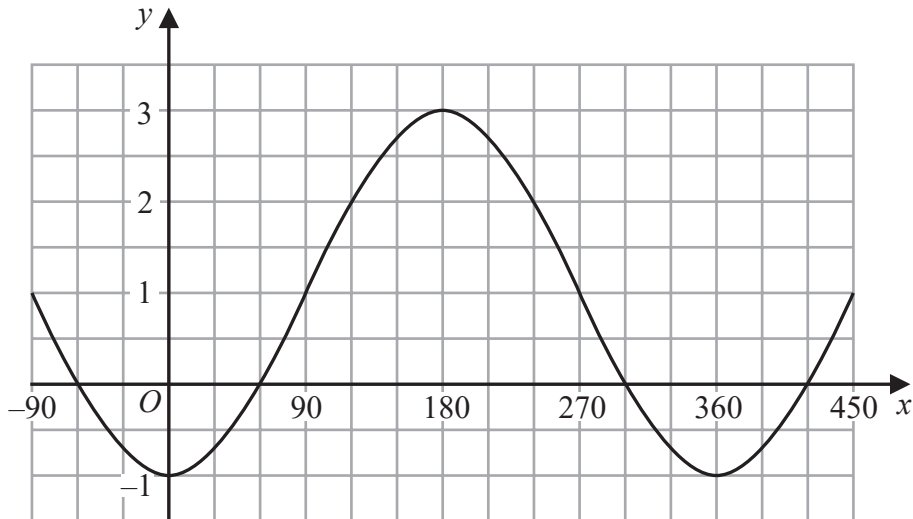
(.....,) (1)

(ii) $y = \frac{1}{2} f(x)$

(.....,) (1)

(2)

The graph of $y = a \sin(x - b)^\circ + c$ for $-90 \leq x \leq 450$ is drawn on the grid below.



(b) Find the value of a , the value of b and the value of c .

$a =$

$b =$

$c =$

(3)

(Total for Question 18 is 5 marks)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



19 Jack plays a game with two fair spinners, **A** and **B**.

Spinner **A** can land on the number 2 or 3 or 5 or 7

Spinner **B** can land on the number 2 or 3 or 4 or 5 or 6

Jack spins both spinners.

He wins the game if one spinner lands on an odd number **and** the other spinner lands on an even number.

Jack plays the game twice.

Work out the probability that Jack wins the game both times.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(Total for Question 19 is 4 marks)



20 ABC is an isosceles triangle such that

$$AB = AC$$

A has coordinates $(4, 37)$

B and C lie on the line with equation $3y = 2x + 12$

Find an equation of the line of symmetry of triangle ABC .

Give your answer in the form $px + qy = r$ where p , q and r are integers.

Show clear algebraic working.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(Total for Question 20 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS

