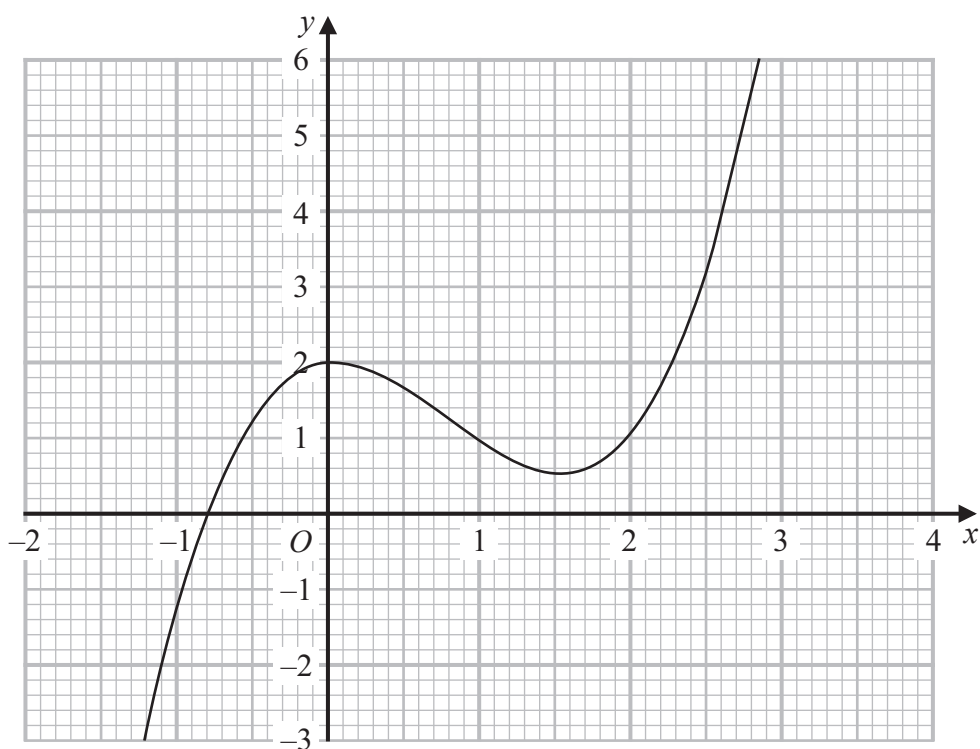


17 Part of the curve with equation  $y = f(x)$  is shown on the grid.



Find an estimate for the gradient of the curve at the point where  $x = 2$   
Show your working clearly.

.....  
(Total for Question 17 is 3 marks)

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18 The line with equation  $2y = x + 1$  intersects the curve with equation  $3y^2 + 7y + 16 = x^2 - x$  at the points  $A$  and  $B$

Find the coordinates of  $A$  and the coordinates of  $B$   
Show clear algebraic working.

(....., ..... ) and (....., ..... )

(Total for Question 18 is 5 marks)



19  $ABCD$  is a horizontal rectangular field.

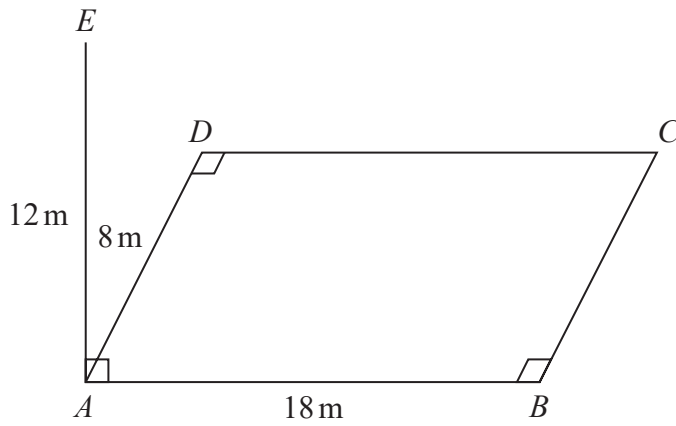


Diagram **NOT** accurately drawn

A vertical pole,  $AE$ , is placed at the corner  $A$  of the field.

$$AE = 12\text{ m} \quad AB = 18\text{ m} \quad AD = 8\text{ m}$$

Calculate the size of the angle between  $EC$  and the plane  $ABCD$   
Give your answer correct to one decimal place.

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(Total for Question 19 is 3 marks)



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20  $y$  is inversely proportional to  $\sqrt{x}$   
 $x$  is directly proportional to  $T^3$

Given that  $y = 8$  when  $T = 25$

find the exact value of  $T$  when  $y = 27$

$T = \dots\dots\dots$

(Total for Question 20 is 4 marks)



- 21 The diagram shows a solid made from a cylinder and a hemisphere.  
The cylinder and the hemisphere are both made from the same metal.

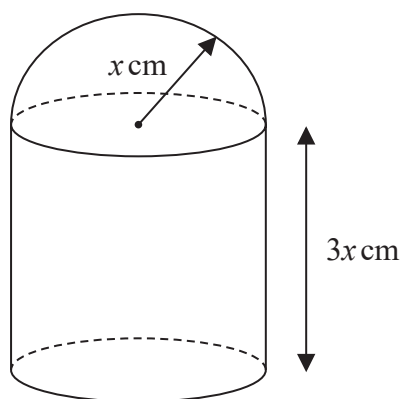


Diagram **NOT**  
accurately drawn

The plane face of the hemisphere coincides with the upper plane face of the cylinder.

The radius of the cylinder and the radius of the hemisphere are both  $x$  cm.  
The height of the cylinder is  $3x$  cm.

The total surface area of the solid is  $81\pi\text{cm}^2$   
The mass of the solid is 840 grams.

The following table gives the density of each of four metals.

Metal	Density ( $\text{g/cm}^3$ )
Aluminium	2.7
Nickel	8.9
Gold	19.3
Silver	10.5

The metal used to make the solid is one of the metals in the table.

Determine the metal used to make the solid.  
Show your working clearly.

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.....  
**(Total for Question 21 is 6 marks)**

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**Turn over for Question 22**



P 6 8 7 2 9 A 0 2 7 3 2

22  $ABC$  is a triangle in which angle  $ABC = 90^\circ$

$p$  and  $q$  are integers such that

the coordinates of  $A$  are  $(p, 10)$

the coordinates of  $B$  are  $(-1, -5)$

the coordinates of  $C$  are  $(8, q)$

Given that the gradient of  $AC$  is  $-\frac{6}{7}$

work out the value of  $p$  and the value of  $q$



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$$p = \dots\dots\dots$$

$$q = \dots\dots\dots$$

**(Total for Question 22 is 5 marks)**

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**Turn over for Question 23**



P 6 8 7 2 9 A 0 2 9 3 2



23 The functions  $f$  and  $g$  are such that

$$f(x) = x + 25 \qquad g(x) = x^2 - 12x$$

The function  $h$  is such that  $h(x) = fg(x)$

The domain of  $h$  is  $\{x : x \leq 6\}$

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

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

(Total for Question 23 is 4 marks)

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**TOTAL FOR PAPER IS 100 MARKS**

