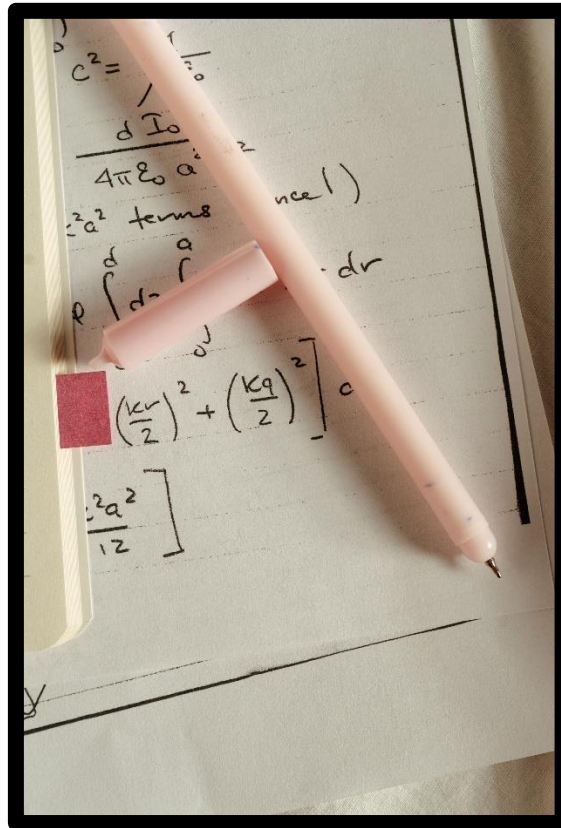


# A-Level Mathematics

## Transition material



NAME: \_\_\_\_\_

Score: \_\_\_\_\_

GCSE to A-level Maths Transition

Name: **Indices and Surds (1)****Q1.**Write down the value of  $7^0$ Answer \_\_\_\_\_  
(Total 1 mark)**Q2.**Given that  $3^x = 9^{x+1}$  work out the value of  $x$ .

---

---

---

---

---

---

---

 $x =$  \_\_\_\_\_  
(Total 2 marks)**Q3.**Simplify  $2^5 \times 2^3$ 

Circle your answer.

$4^8$

$2^8$

$2^{15}$

$4^{15}$

(Total 1 mark)

**Q4.**Simplify  $(5^4)^2$ 

Circle your answer.

$5^6$

$5^8$

$25^6$

$25^8$

**(Total 1 mark)****Q5.**Circle the value of  $9^{-\frac{1}{2}}$ 

$\frac{1}{81}$

$\frac{1}{3}$

$-3$

$-4\frac{1}{2}$

**(Total 1 mark)****Q6.**Show that  $\frac{14}{\sqrt{7}}$  can be written in the form  $a\sqrt{b}$  where  $a$  and  $b$  are integers.

---

---

---

---

---

**(Total 2 marks)****Q7.**(a) Write  $\sqrt{72}$  in the form  $a\sqrt{2}$  where  $a$  is an integer.

---

---

Answer \_\_\_\_\_

**(1)**

(b) Work out  $(\sqrt{6} + \sqrt{12})^2$

Give your answer in the form  $c + d\sqrt{2}$  where  $c$  and  $d$  are integers.

---

---

---

---

---

---

---

---

---

---

Answer \_\_\_\_\_

(3)

(Total 4 marks)

**Q8.**

Show that  $\frac{\sqrt{150} - \sqrt{6}}{\sqrt{2} \times \sqrt{3}}$  simplifies to an integer.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

(Total 3 marks)

Q9.

Simplify  $\sqrt{80} + \sqrt{2\frac{2}{9}}$

Give your answer in the form  $\frac{a\sqrt{b}}{b}$  where  $a$  and  $b$  are integers.

---

---

---

---

---

---

---

---

Answer \_\_\_\_\_

(Total 3 marks)

Q10.

Expand and simplify fully  $(\sqrt{10} + \sqrt{2})(\sqrt{15} - \sqrt{3})$

Give your answer in the form  $a\sqrt{b}$ , where  $a$  and  $b$  are integers.

---

---

---

---

---

---

---

---

---

---

---

---

Answer \_\_\_\_\_

(Total 4 marks)

GCSE to A-level Maths Transition

Name:

**Quadratics (1)**

**Q1.**

Circle the **two** roots of  $(x - 5)(x + 3) = 0$

-5                      -3                      3                      5

(Total 1 mark)

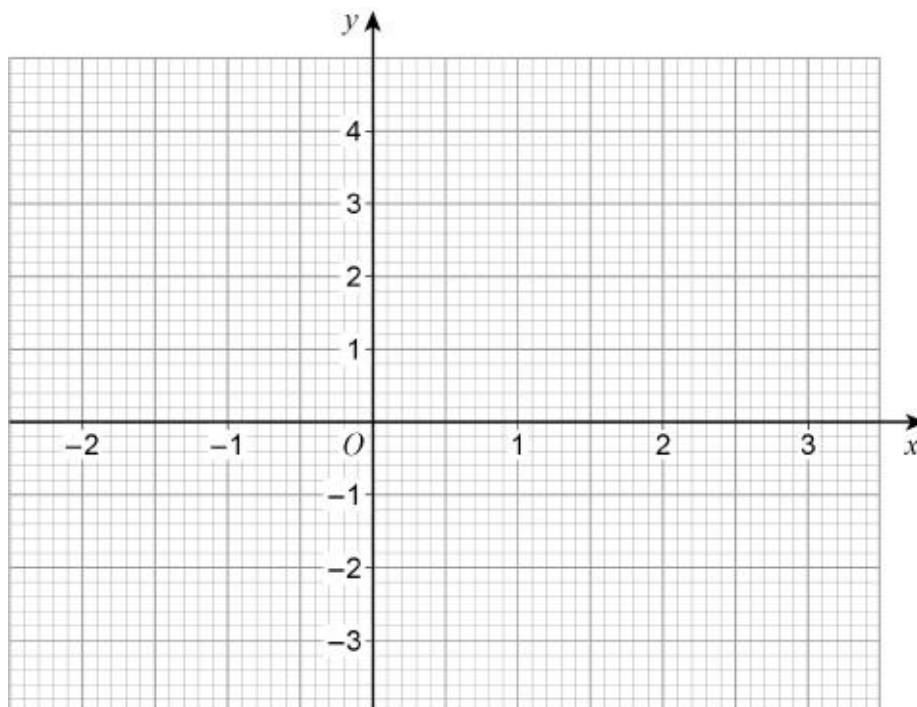
**Q2.**

(a) Complete the table of values for  $y = x^2 - x - 2$

$x$	-2	-1	0	1	2	3
$y$			-2	-2		4

(2)

(b) Draw the graph of  $y = x^2 - x - 2$  for values of  $x$  from -2 to 3



(2)

(c) Write down the  $x$ -coordinate of the turning point of the graph.

Answer \_\_\_\_\_

(1)

(Total 5 marks)

### Q3.

The equation of a curve is  $y = (x + 3)^2 + 5$

Circle the coordinates of the turning point.

(5, 3)

(5, -3)

(3, 5)

(-3, 5)

(Total 1 mark)

### Q4.

(a) Write  $x^2 + 6x + 10$  in the form  $(x + a)^2 + b$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Answer \_\_\_\_\_

(2)

(b) Hence, write down the coordinates of the turning point of the curve  $y = x^2 + 6x + 10$

Answer (\_\_\_\_\_)

(1)

(Total 3 marks)

### Q5.

(a) Factorise  $x^2 + 5x - 24$

\_\_\_\_\_

\_\_\_\_\_

Answer \_\_\_\_\_

(2)

(b) Solve  $x^2 + 5x - 24 = 0$

\_\_\_\_\_

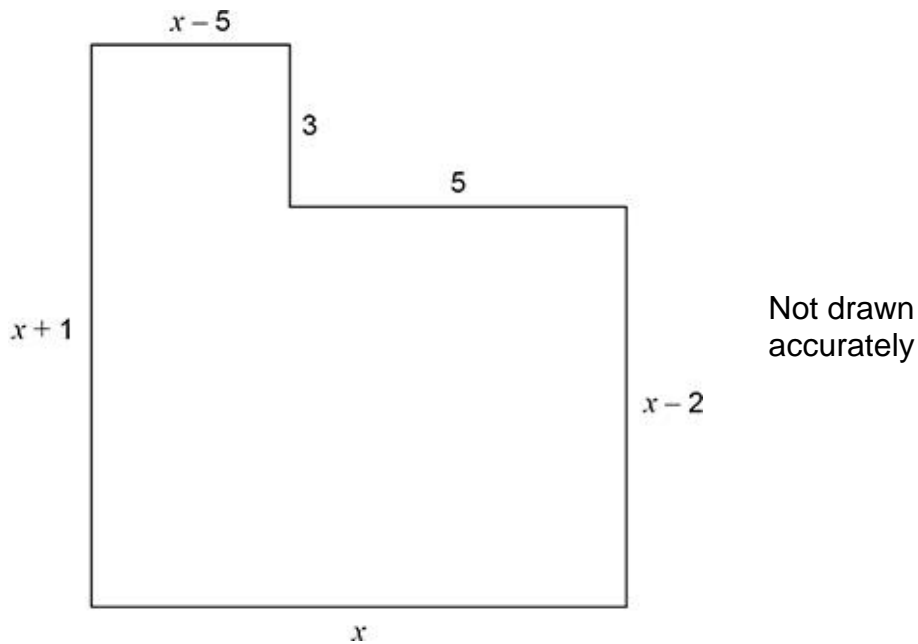
Answer \_\_\_\_\_

(1)

(Total 3 marks)

**Q6.**

Here is the plan of the floor of an L-shaped room.  
All lengths are in metres.



- (a) The area of the floor is  $75 \text{ m}^2$

Show that  $x^2 + x - 90 = 0$

---

---

---

---

---

---

---

---

(3)

- (b) By factorising  $x^2 + x - 90$  work out the value of  $x$ .

You **must** show your working

---

---

$x =$  \_\_\_\_\_

(2)

(Total 5 marks)

**Q7.**

The expression  $\frac{x^2 - 9}{x^2 + bx - 15}$  simplifies to  $\frac{x + 3}{x + 5}$

Work out the value of  $b$ .

---

---

---

---

---

---

---

---

---

---

$$b = \underline{\hspace{10cm}}$$

(Total 3 marks)

**Q8.**

Solve the quadratic equation

$$6x^2 + 2x - 5 = 0$$

Give your answers to 2 decimal places.

---

---

---

---

---

---

---

---

---

---

Answer  $\underline{\hspace{10cm}}$

(Total 3 marks)









**Q7.**

Expressions for consecutive triangular numbers are

$$\frac{n(n+1)}{2} \quad \text{and} \quad \frac{(n+1)(n+2)}{2}$$

Prove that the sum of two consecutive triangular numbers is always a square number.

---

---

---

---

---

---

---

---

---

---

(Total 4 marks)

**Q8.**

Two integers have a difference of 3.

The difference between the squares of the two integers is three times the sum of the integers.

$$\text{For example, } 13 - 10 = 3, \quad 13^2 - 10^2 = 169 - 100 = 69$$

$$\text{and } 3 \times (13 + 10) = 3 \times 23 = 69$$

Prove this result algebraically.

---

---

---

---

---

---

---

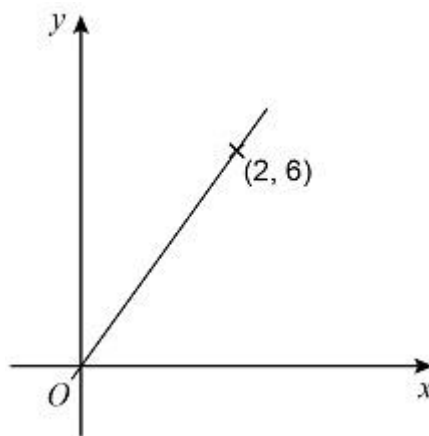
---

---

---

(Total 4 marks)

GCSE to A-level Maths Transition

Name: **Straight Lines and Circles (1)****Q1.**A straight line passes through  $O$  and  $(2, 6)$ 

Circle the equation of the line.

$y = x + 4$

$y = 6$

$y = 3x$

$y = \frac{1}{3}x$

**(Total 1 mark)****Q2.**The equation of a straight line is  $2y = 3x + 5$ 

Circle the gradient of the line.

$\frac{2}{3}$

$\frac{3}{2}$

3

5

**(Total 1 mark)**

**Q3.**

- (a) Show that the lines  $y = 3x + 7$  and  $2y - 6x = 8$  are parallel.  
Do **not** use a graphical method.

---

---

---

---

---

---

---

---

---

---

(3)

- (b) Is the point  $(-5, -6)$  above, below or on the line  $y = 3x + 7$ ?  
Tick **one** box.

Above

Below

On the line

You **must** show your working  
Do **not** use a graphical method.

---

---

---

---

---

---

---

---

---

---

(2)

(Total 5 marks)

**Q4.**Line A has equation  $y = 4x - 1$ 

Line B is

perpendicular to line A

and

passes through the point (8, 5)

Work out the coordinates of the point where line B intersects the  $x$ -axis.

---

---

---

---

---

---

---

---

---

---

Answer ( \_\_\_\_\_ , \_\_\_\_\_ )

(Total 4 marks)

**Q5.**A circle has equation  $x^2 + y^2 = 4$ 

Circle the length of its radius.

2

4

8

16

(Total 1 mark)

**Q6.**The equation of a circle is  $x^2 + y^2 = 9$ Work out the length of the **diameter**.

Circle your answer.

3

6

9

18

(Total 1 mark)

**Q7.**

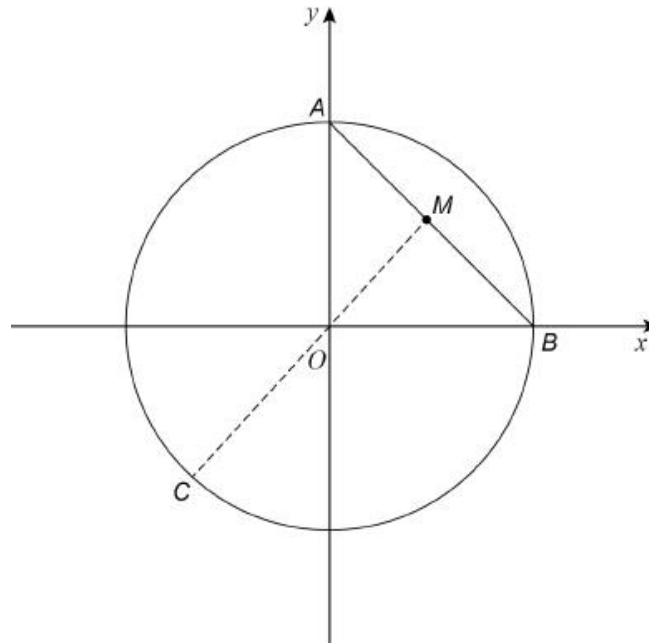
$A, B$  and  $C$  are points on the circle  $x^2 + y^2 = 36$  as shown.

$A$  is on the  $y$ -axis.

$B$  is on the  $x$ -axis.

$M$  is the midpoint of  $AB$ .

$COM$  is a straight line.



(a) Show that the coordinates of  $A$  are  $(0, 6)$

---



---

(1)

(b) Work out the coordinates of  $B$ .

---



---

Answer ( \_\_\_\_\_ , \_\_\_\_\_ )

(1)

(c) Show that the equation of the straight line passing through  $C, O$  and  $M$  is  $y = x$

---



---



---



---

(2)

- (d) Work out the coordinates of  $C$ .  
Give your answers in surd form.

---



---

Answer ( \_\_\_\_\_ , \_\_\_\_\_ )

(3)

(Total 7 marks)

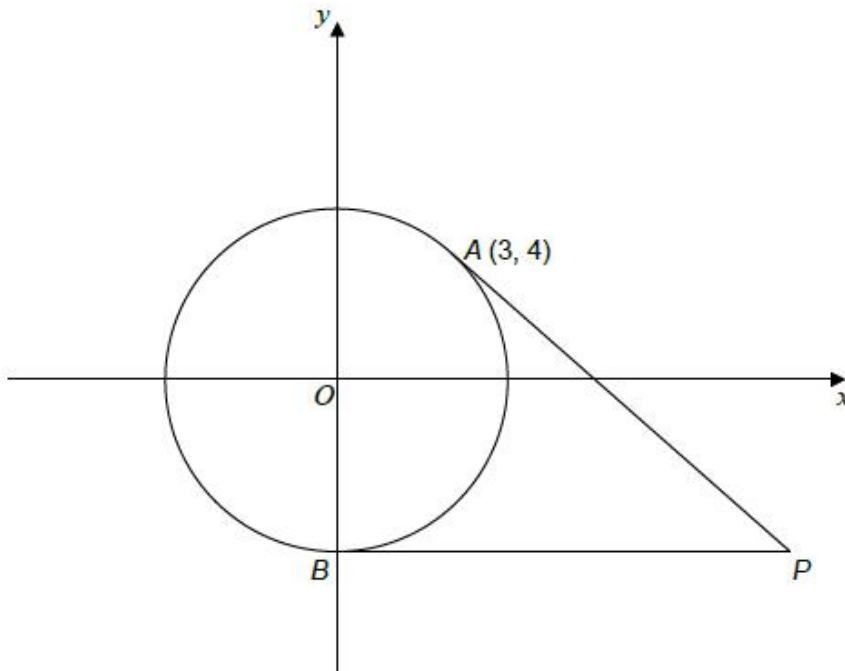
**Q8.**

$A$  and  $B$  are points on the circle with equation  $x^2 + y^2 = 25$

$A$  is  $(3, 4)$

$B$  is a point on the  $y$ -axis.

$PA$  and  $PB$  are tangents.



- (a) Show that the coordinates of  $B$  are  $(0, -5)$

---



---

(1)

- (b) Give a reason why  $PA = PB$

---



---

(1)

(c)  $P$  is the point  $(a, b)$

Work out the values of  $a$  and  $b$ .

---

---

---

---

---

---

---

---

---

---

$a =$  \_\_\_\_\_

$b =$  \_\_\_\_\_

(4)  
(Total 6 marks)

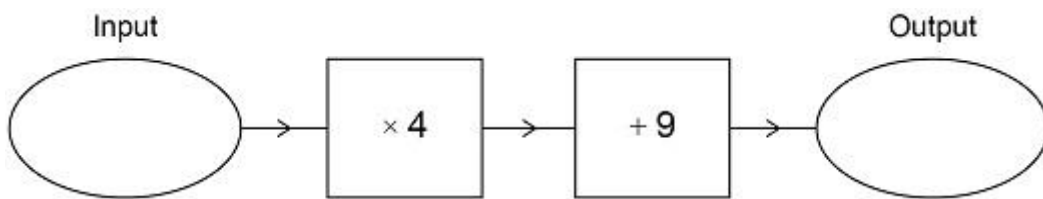
GCSE to A-level Maths Transition

Name:

**Functions (1)**

**Q1.**

Here is a number machine.



Work out the output when the input is 16

---



---

Answer \_\_\_\_\_

(Total 1 mark)

**Q2.**

$$f(x) = x^2 - x^3$$

Circle the value of  $f(-3)$

18

-18

36

-36

(Total 1 mark)

**Q3.**

$$f(x) = 3x \quad \text{and} \quad g(x) = x^2$$

Circle the expression for  $fg(x)$

$3x^2$

$9x^2$

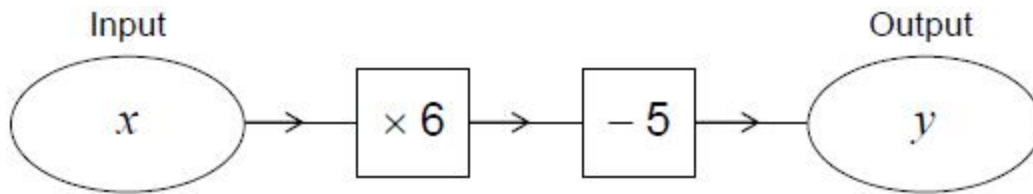
$3x^3$

$9x^4$

(Total 1 mark)

**Q4.**

- (a) Work out the output  $y$  when  $x = 4$




---

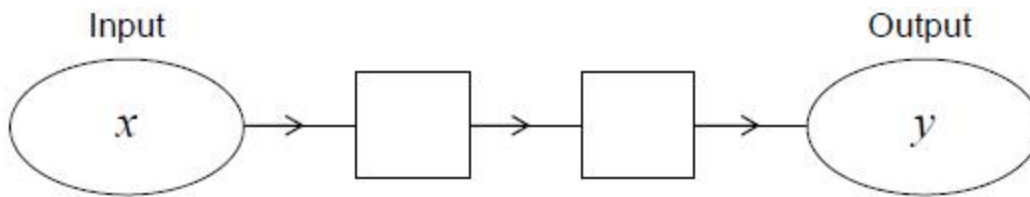


---

Answer \_\_\_\_\_

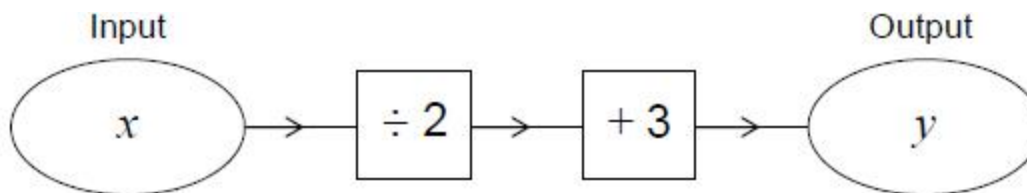
(1)

- (b) Complete this number machine so that  $y = 2(x + 7)$



(1)

- (c) Here is a different number machine.



Which equation is correct for this machine?

Circle your answer.

$y = \frac{x}{2} + 3$

$x = \frac{y}{2} + 3$

$x = \frac{y+3}{2}$

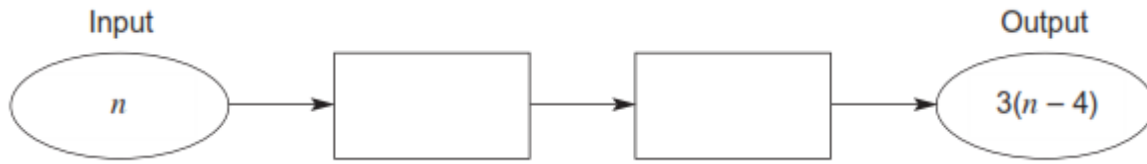
$y = \frac{x+3}{2}$

(1)

**(Total 3 marks)**

**Q5.**

Here is a number machine.



(a) Write an operation in each box to make the number machine work.

(2)

(b) Work out the value of  $n$  when the input and output are equal.

---



---



---

Answer  $n =$  \_\_\_\_\_

(2)

(Total 4 marks)

**Q6.**

For all values of  $x$ ,  $f(x) = \frac{4x-3}{5}$

Work out  $f^{-1}(x)$

---



---



---



---



---



---



---



---



---



---

Answer \_\_\_\_\_

(Total 3 marks)

Q7.

$$f(x) = 2x^2$$

$$g(x) = x + 5$$

Circle the composite function  $fg(x)$

$$2x^2 + 5$$

$$2(x + 5)^2$$

$$2(x^2 + 5)$$

$$4(x + 5)^2$$

(Total 1 mark)

Q8.

$$f(x) = \frac{x}{x+2} \quad g(x) = x^2 - 2$$

Work out  $fg(x)$

Give your answer in the form  $a + bx^n$  where  $a, b$  and  $n$  are integers.

---

---

---

---

---

---

---

---

---

---

Answer \_\_\_\_\_

(Total 3 marks)

Q9.

For all values of  $x$ ,  $f(x) = x^2 + 1$      $g(x) = x - 5$

(a) Show that  $fg(x) = x^2 - 10x + 26$

---

---

---

---

---

---

---

(2)

(b) Solve  $fg(x) = gf(x)$

---

---

---

---

---

---

---

---

---

---

$x =$  \_\_\_\_\_

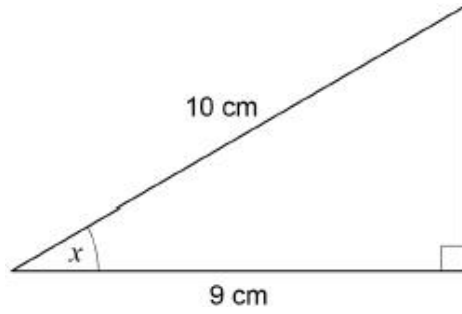
(4)

(Total 6 marks)



**Q3.**

Use trigonometry to work out the size of angle  $x$ .



Not drawn accurately

---



---



---



---

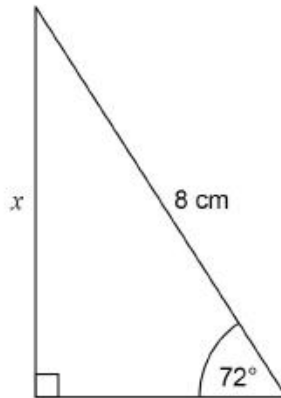


---

Answer \_\_\_\_\_ degrees  
(Total 2 marks)

**Q4.**

Use trigonometry to work out the length  $x$ .



Not drawn accurately

---



---



---



---

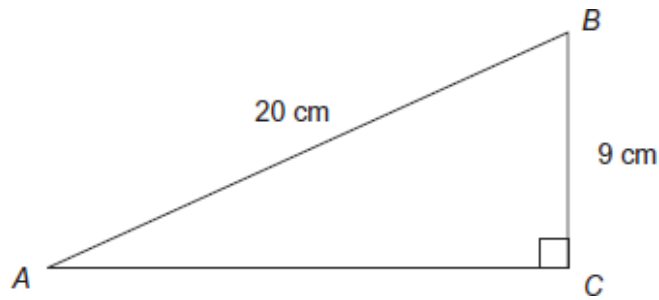


---

Answer \_\_\_\_\_ cm  
(Total 2 marks)

**Q5.**

Not drawn accurately



Work out the length AC.

---



---

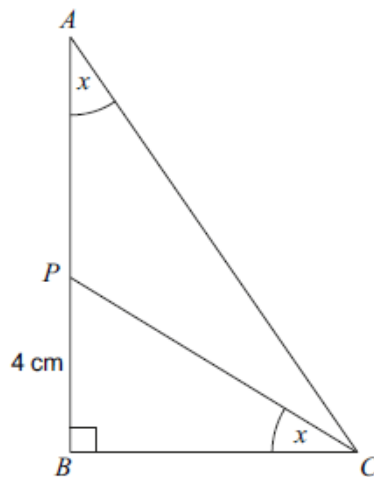
Answer \_\_\_\_\_ cm

**(Total 3 marks)**

**Q6.**

$ABC$  is a right-angled triangle.

$P$  is a point on  $AB$ .



Not drawn accurately

$BP = 4\text{cm}$  and  $\tan x = \frac{2}{3}$

(a) Work out the length of  $BC$ .

---



---



---

Answer \_\_\_\_\_ cm

**(2)**

(b) Work out the length of  $AP$ .

---



---



---



---



---



---

Answer \_\_\_\_\_ cm

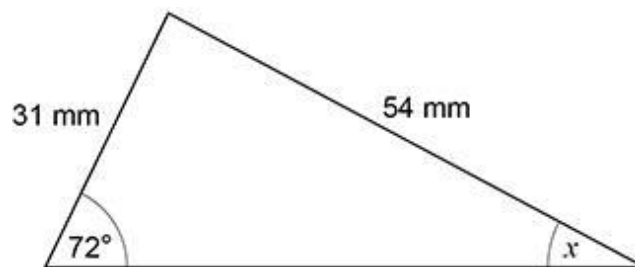
(3)

(Total 5 marks)

**Q7.**

Here is a triangle.

Not drawn accurately



Leah tries to use the sine rule to work out the size of angle  $x$ .

Here are the first two lines of her working.

$$\frac{x}{\sin 31} = \frac{54}{\sin 72}$$

$$x = \frac{54 \sin 31}{\sin 72}$$

What error has she made in this working?

---



---



---



---

(Total 1 mark)

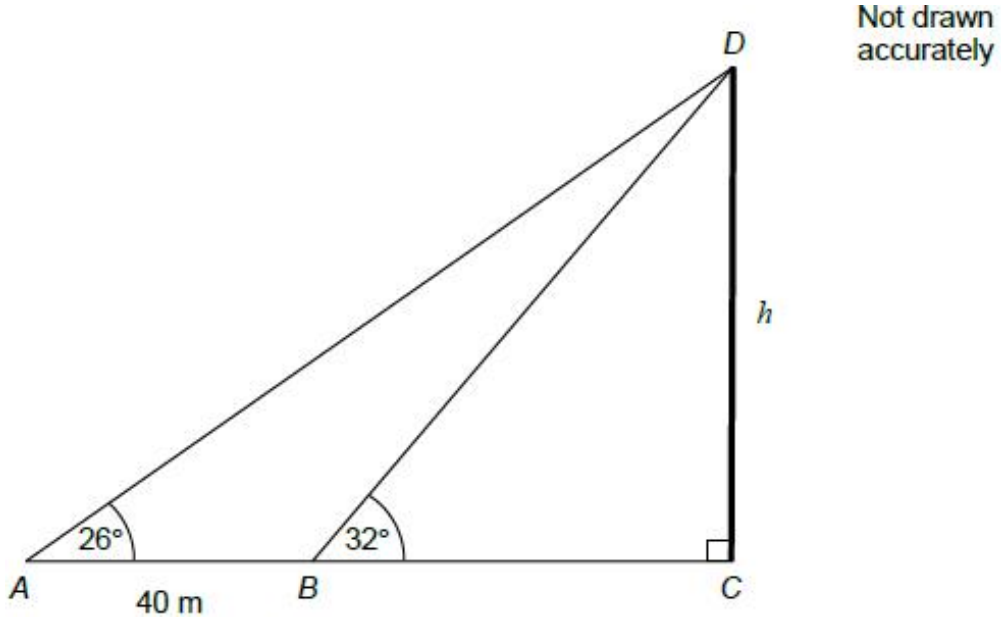


**Q9.**

The diagram shows a vertical tower  $CD$  of height,  $h$ , metres.

$ABC$  is horizontal.

$AB = 40$  metres.



Work out the height,  $h$ , of the tower.

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

---

Answer \_\_\_\_\_ metres  
(Total 5 marks)