OCR
Oxford Cambridge and RSA

MR BRADDER MATHS H

# Mr Bradder Maths

# Predicted Paper 5

# June 2025 VERSION 2

MR BRADDER MATHS

**You may use:**
- geometrical instruments
- tracing paper

**Do not use:**
- a calculator

Please write clearly in black ink. **Do not write in the barcodes.**

Centre number | | | | | | Candidate number | | | | |

First name(s) _____

Last name _____

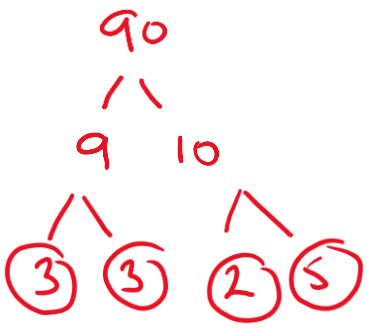
## INSTRUCTIONS

- Use black ink. You may use an HB pencil for graphs and diagrams.
- Answer **all** the questions.
- Read each question carefully before you start to write your answer.
- Where appropriate, your answers should be supported with working. Marks may be given for a correct method even if the answer is incorrect.
- Write your answer to each question in the space provided.
- Additional paper may be used if required but you must clearly show your candidate number, centre number and question number(s).

## INFORMATION

- The total mark for this paper is **116**
- The marks for each question are shown in brackets **[ ]**.
- This document consists of **16** pages.

**1** Write 90 as a product of its prime factors.




$2 \times 3 \times 3 \times 5$

or $2 \times 3^2 \times 5$

.....[2]

**2** A clock chimes every 20 minutes.

A light flashes every 5 minutes.

The clock chimes and the light flashes together at 08:00.

How many times between 08:01 and 12:30 will the clock chime and the light flash together?

Show your working.

Will work togethe every 20th minute

So 8:20 8:40 9:00
9:20 9:40 10:00
10:20 10:40 11:00
11:20 11:40 12:00
12:20 12:~~40~~

13 times

.....[5]

**3** Work out. $4\frac{2}{5} \times \frac{5}{11}$ Give your answer as a mixed number in its simplest form.

$\frac{22}{\cancel{5}} \times \frac{\cancel{5}}{11} = \frac{22}{11} = 2$

.....[3]

5 10 4

**4** A car accelerates at 5.04 m/s$^2$ for 9.8 seconds from an initial velocity of 3.87 m/s.

Harper rounds each value to 1 significant figure.

Harper uses the rounded values and the formula

$$s = ut + \frac{1}{2}at^2$$

Use Harper's method to estimate the distance travelled in the 9.8 seconds.

$s = (4 \times 10) + \frac{1}{2} \times 5 \times 10^2$ — 100

$= 40 + 250 = 290\text{m}$

**[4]**

**5** The angles in a triangle are in the ratio 10 : 4 : 4. — 18 parts

**(a)** Show that the triangle is isosceles and work out the length of the largest angle.

**[2]**

$180° \div 18 = 10$

Angles are $10 \times 10 = 100°$

$4 \times 10 = 40°$
$4 \times 10 = 40°$
} Isosceles

**(b)** The longest side of the triangle is 200 cm long.

Calculate the length of the other sides in the triangle.

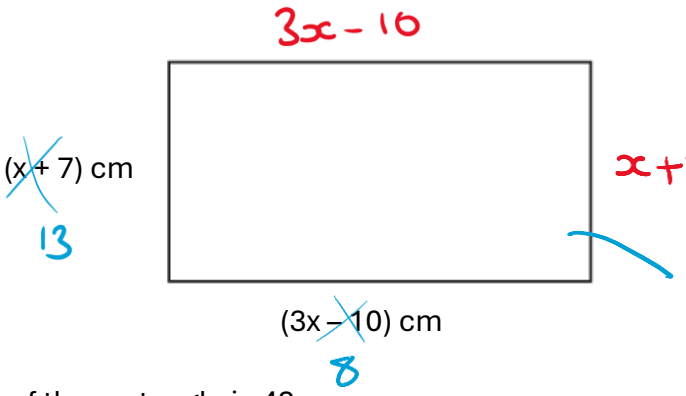
10 : 4 : 4

×20 ( ÷ ) ×20

200 : 80 : 80

**(b)** 80 ..... **cm [2]**

**6** This rectangle has length (3x – 10) cm and width (x + 7) cm.




Area = 8 × 13
= 104 cm²

The perimeter of the rectangle is 42 cm.

Calculate the area of the rectangle.

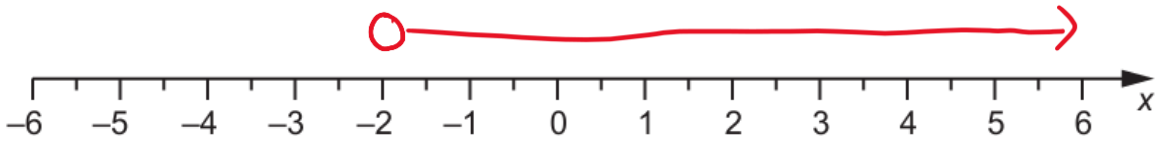
$3x-10 + 3x-10 + x+7 + x+7 = 42$

$8x - 6 = 42$

$8x = 48$ $\quad x = 6$

104 ..... cm² **[5]**

**7** Solve the inequality 4x - 1 > – 9 and represent your solution on the number line




$4x-1 > -9$

$+1 \quad +1$

$4x > -8$

$\div 4 \quad \div 4$

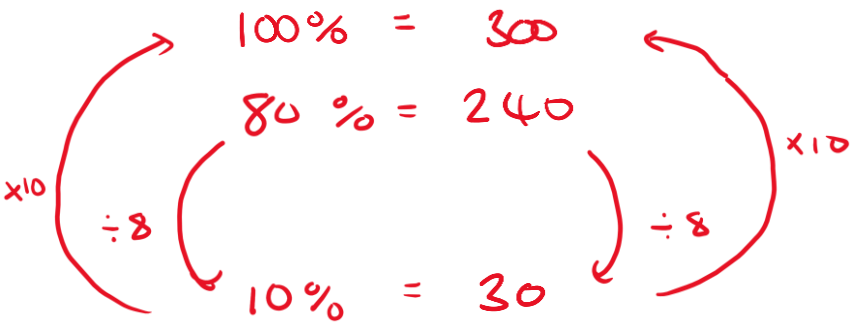
$x > -2$

**[3]**

**8** Naomi is given a 20% pay decrease.

Her new wage is £240 per week.

What would be her weekly wage if, instead, she had received a 20% pay increase?



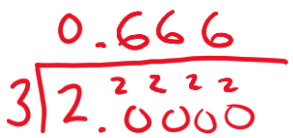

100% = £300

20% = £60

120% = £360

£..... **[5]**

**9** (a) Write 2/3 as a recurring decimal.




0.6̇

**(a)** ..... **[2]**

(b) Convert 0.1$\dot{5}$ to a fraction. Give your answer in its lowest terms.

$x = 0.1555$

$10x = 1.555$

$100x = 15.555$

$100x - 10x = 15.5 - 1.5$

$90x = 14$

$x = \frac{14}{90} = \frac{7}{45}$

**(b)** ..... **[3]**

**10** A car mechanic has a tin containing 10 litres of engine oil.

Each week they use 550 millilitres of this oil for their vehicles.

The car mechanic says After 9 weeks I will have used over 50% of the oil in this tin.

Are they correct? Show how you decide.

10L = 10 000 mL

50% = 5000 mL

550 × 9 = 550 × 9 = 4950 used after 9 weeks

Not correct

**[5]**

**11** Solve by factorisation.

$3x^2 + 11x + 6 = 0$

$3 \times 6 = 18$

$\times$

9 and 2 $\Rightarrow$ $3x^2 + 9x + 2x + 6 = 0$

$3x(x+3) + 2(x+3) = 0$

$(3x+2)(x+3) = 0$

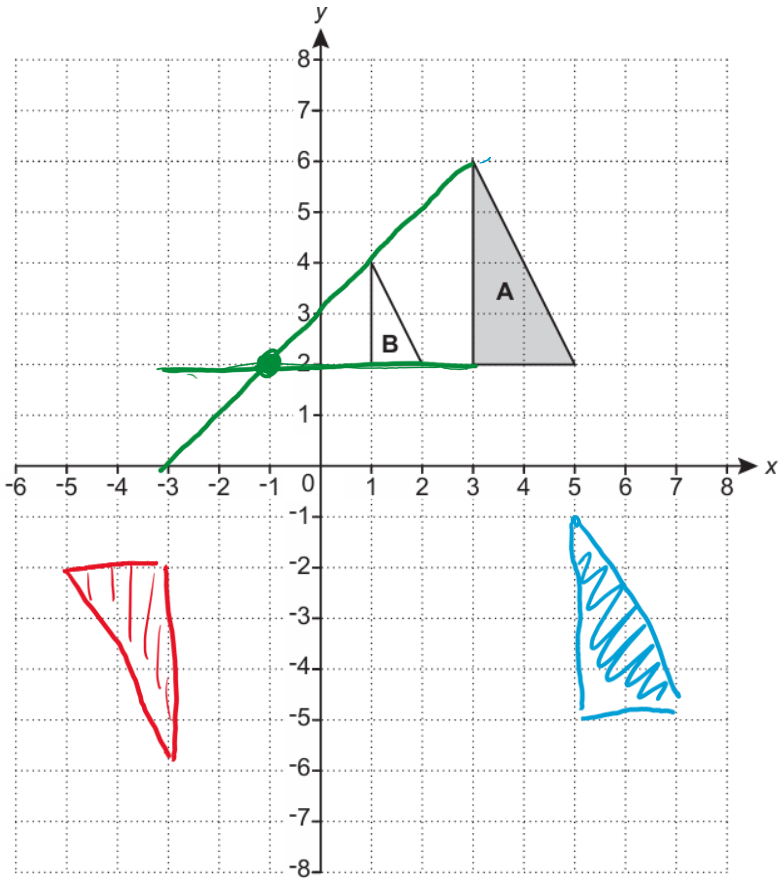
$3x + 2 = 0$

$3x = -2$

$x = -\frac{2}{3}$

$x = -\frac{2}{3}$ or $x = -3$ **[3]**

**12** Triangle A and triangle B are drawn on the coordinate grid.




(a) (i) Draw the image of triangle A after a rotation of 180 ° about (0, 0).

**[2]**

(ii) Draw the image of triangle A after a translation by the vector $\begin{pmatrix} 2 \\ -7 \end{pmatrix}$.

**[2]**

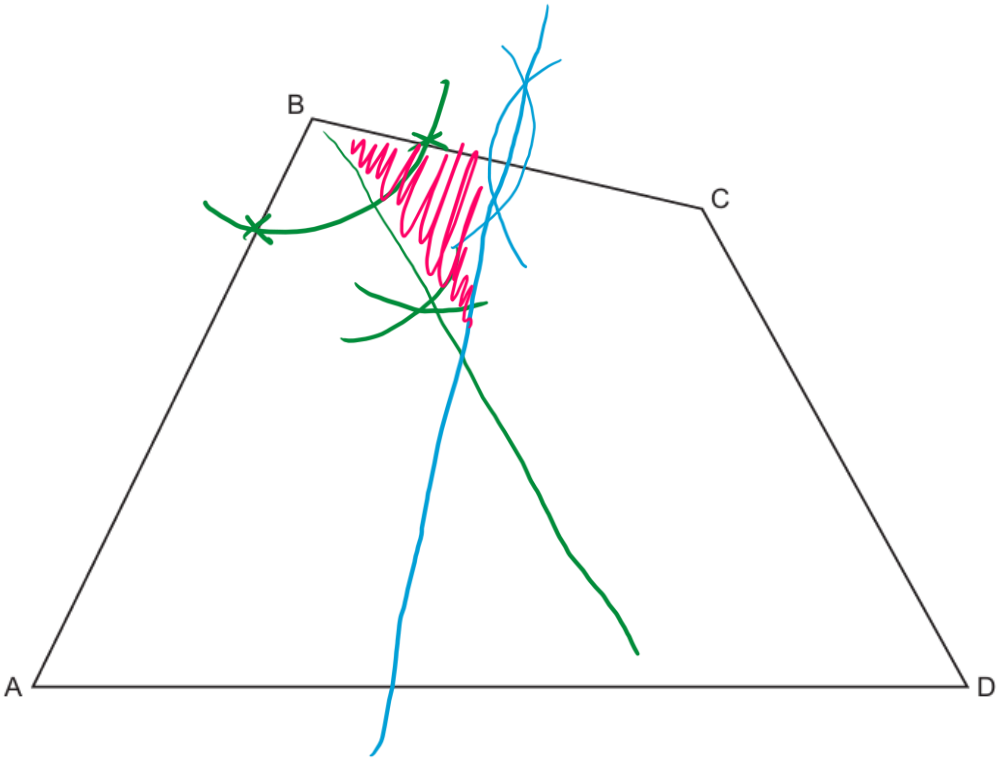
(b) Describe fully the single transformation that maps triangle A onto triangle B.

Enlargement, Scale Factor $\frac{1}{2}$

Centre (-1, 2)

**[3]**

**13** ABCD is a quadrilateral.




**(a)** Construct the bisector of angle ABC.
Show all your construction lines. **[2]**

**(b)** Construct the perpendicular bisector of BC.
Show all your construction lines. **[2]**

**(c)** Shade the region which is

- nearer to BC than to AB

and

- nearer to B than to C.

**[1]**

**14** Use algebra to prove that an odd number multiplied by a different odd number always gives an answer that is an odd number. **[4]**

$\text{odd} = 2n+1$

Different odd $= 2m+1$

$(2n+1)(2m+1)$

$4nm + 2n + 2m + 1$

$= \underbrace{2(2nm+n+m)}_{\text{even}} + 1$ ← even + 1 = odd

**15** Evaluate $27^{-\frac{2}{3}}$ **[3]**

$27^{\frac{1}{3}} = \sqrt[3]{27} = 3$

$3^2 = 9$

$9^{-1} = \frac{1}{9}$

**16** A sphere has radius $x$ cm.
A cone has radius $R$ cm and height $2R$ cm.

The volume of the sphere is equal to the volume of the cone.

Write $R$ in terms of $x$.

[The volume $V$ of a sphere with radius $r$ is $V = \frac{4}{3}\pi r^3$.

The volume $V$ of a cone with radius $r$ and height $h$ is $V = \frac{1}{3}\pi r^2 h$.]

$\frac{4}{3}\pi x^3 = \frac{1}{3}\pi \times 2R^2$

$4x^3 = 2R^2$

$\div 2 \quad \div 2$

$2x^3 = R^2$

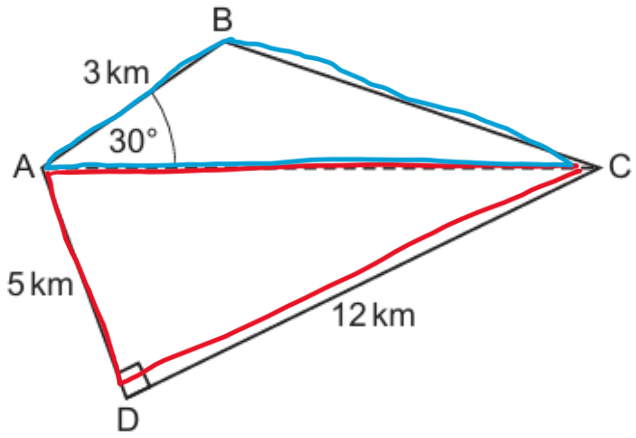
$\sqrt{\quad} \quad \sqrt{\quad}$

$R = \sqrt{2x^3}$

$(R^2 \times 2R = 2R^2)$

..... **[5]**

**17** The diagram shows some land in the shape of a quadrilateral, ABCD.

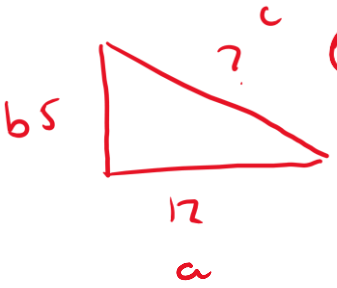



**Not to scale**

AB = 3 km, AD = 5 km, CD = 12 km and angle BAC = 30°.

The land is sold for £10 million per square kilometre.

Calculate the total cost of the land.




① $a^2+b^2=c^2$

$12^2+5^2=c^2$

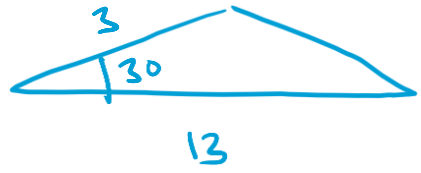
$144+25=c^2$

$169=c^2$

$c=13$

② Area $= \frac{5\times12}{2} = 30\text{km}^2$

③




Area $= \frac{1}{2}ab\sin C$

$= \frac{1}{2}\times13\times3\times\sin30$

$= \frac{1}{4}\times39$

$= 9.75\text{km}^2$

Total area

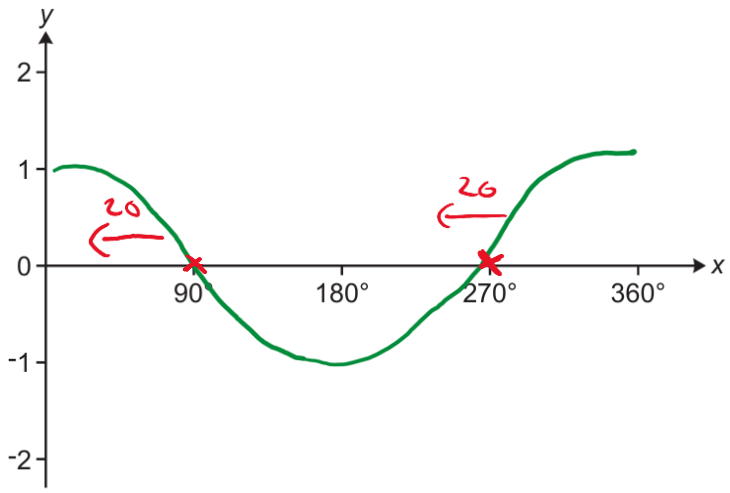
$= 30 + 9.75$

$= 39.75\text{km}^2$

$\times 10 = 397.5$ millions

£..... million **[7]**

**18** (a) Sketch the graph of y = cos x for $0° \leqslant x \leqslant 360°$




**[2]**

(b) The graph of y = cos (x + 20) for $0° \leqslant x \leqslant 360°$ crosses the x-axis in two places.

Write down the values of x where this occurs.

90 - 20 = 70

270 - 20 = 250

**x =** 70 **and** 250 **[2]**

**19** Adam has 10 sweets in a bag.
5 are cherry sweets, 4 are lemon sweets and 1 is an orange sweet.
Adam chooses a sweet at random from the bag and eats it. He then takes another sweet at random from the bag and eats it.

(a) Adam says

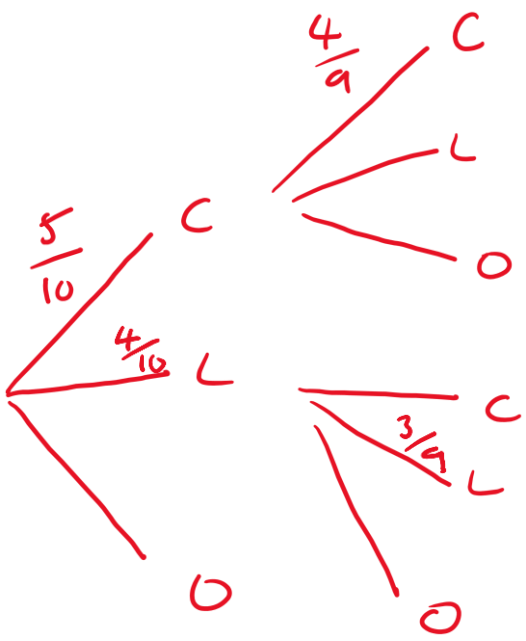
The probability that I choose two cherry sweets is $\frac{25}{100}$.

He is incorrect. Explain his error.

Should be $\frac{5}{10} \times \frac{4}{9} = \frac{20}{90}$ (He eats one)

**[2]**

(b) Find the probability that the two sweets he chooses have different flavours. (b)




$CC = \frac{5}{10} \times \frac{4}{9} = \frac{20}{90}$

$LL = \frac{4}{10} \times \frac{3}{9} = \frac{12}{90}$

only 1 orange so can't get 2 oranges

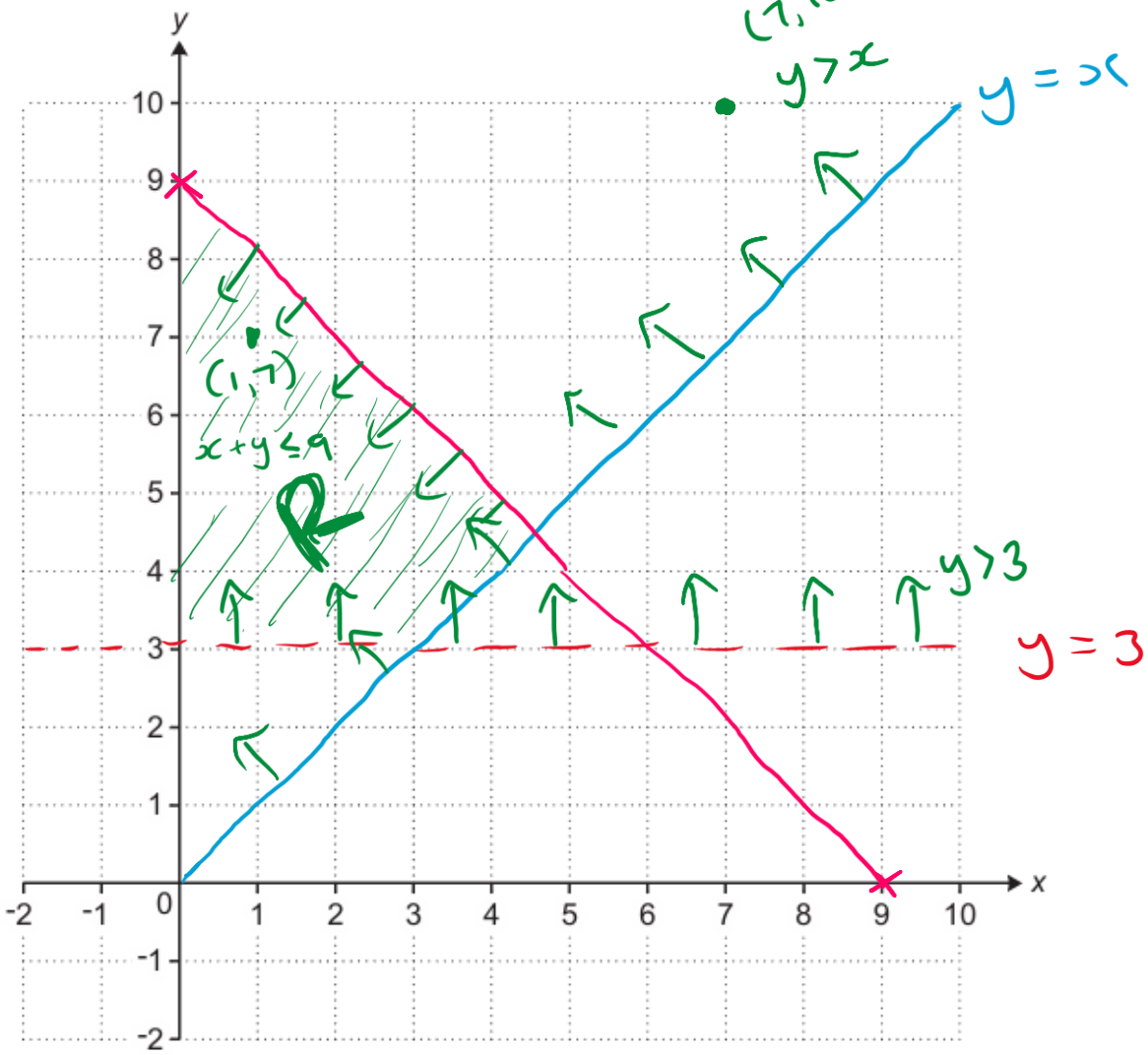
Same $= \frac{20}{90} + \frac{12}{90} = \frac{32}{90}$ ✓

**[4]**

**20** Region **R** satisfies these inequalities.

$y > 3$ ⇒ $y = 3$ (dashed line)
$y \geqslant x$ ⇒ $y = x$ (solid line)
$x + y \leqslant 9$ ⇒ $x + y = 9$ (solid line)

By drawing three straight lines on the grid, find and label the region **R**.

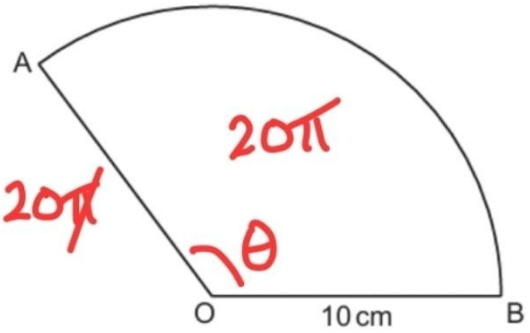



**[6]**

lots of marks so BEWARE

**21** AOB is a sector of a circle, centre O and radius 10 cm.

Big up WAINWRIGHT for ANSWER!!




Not to scale

$\frac{\theta}{360} \times \pi \times 10^2 = 20\pi$

$\theta = \frac{360 \times 20}{100} = 72°$

$Arc = \frac{72}{360} \times \pi \times 20$

$= \frac{36}{180} \times \pi \times 20$

$= \frac{720}{180} \times \pi$

$= 4\pi$

The area of the sector is $20\pi$ cm$^2$.

Work out the perimeter of the sector.

Give your answer in the form $a + b\pi$.

You must show your working.

..... cm [6]

$Perimeter = 4\pi + 10 + 10$

$= 4\pi + 20$

**22** Simplify fully.

$$\frac{x^2 - 100}{x^2 - 7x - 30}$$

$(x+10)(x-10)$ $\quad$ $(x-10)(x+3)$

$$\frac{(x+10)(x-10)}{(x-10)(x+3)}$$

$$\frac{x+10}{x+3}$$

.....[5]

**23** Here are the first four terms of a quadratic sequence.

2 6 12 20

The nth term is $an^2 + bn + c$.
Find the values of a, b and c.

$n^2 + n$

2 6 12 20

+4 +6 +8

+2 +2

÷2

$n^2$ = 1 4 9 16

1 2 3 4

+1 +1 +1

= n (no ± on end)

a = 1

b = 1

c = 0

[4]

**24** (a) (i) Write $x^2 + 6x - 20$ in the form $(x+a)^2 - b$

$(x+3)^2 - 9 - 20$

$(x+3)^2 - 29$

**(a)(i)** ..... **[3]**

(ii) Solve the equation $x^2 + 6x - 20 = 0$

Give your answers in surd form as simply as possible.

$(x+3)^2 - 29 = 0$

$(x+3)^2 = 29$

$x+3 = \pm\sqrt{29}$

$x = -3 \pm \sqrt{29}$

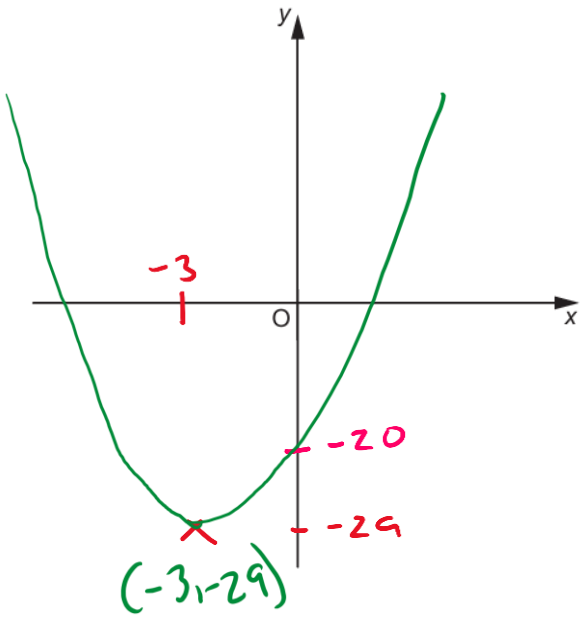
**(ii) x =** $3+\sqrt{29}$ **or x =** $3-\sqrt{29}$ **[4]**

(b) Sketch the graph of $x^2 + 6x - 20$ showing clearly the coordinates of any turning points.

$(x+3)^2 - 29$

Turning Point

$= (-3, -29)$




**[3]**