

Write your name here	
Surname	Other names
Centre Number	Candidate Number
Edexcel GCSE	
<b>Mathematics B</b>	
<b>Unit 3: Number, Algebra, Geometry 2 (Calculator)</b>	
<b>Higher Tier</b>	
Mock paper <b>Time: 1 hour 45 minutes</b>	Paper Reference <b>5MB3H/01</b>
<b>You must have:</b> Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.	Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- **Calculators may be used.**
- If your calculator does not have a  $\pi$  button, take the value of  $\pi$  to be 3.142 unless the question instructs otherwise.



### Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (\*) are ones where the quality of your written communication will be assessed.

### Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

W41054A

©2011 Edexcel Limited.  
6/6/3/3



edexcel   
advancing learning, changing lives

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

- 1 5 identical calculators cost a total of £31.75

Work out the cost of 7 of these calculators.

$$\text{Cost each} = \frac{£31.75}{5} = £6.35$$

$$\therefore 7 \text{ will cost } 7 \times 6.35 = £44.45$$

£ 44.45

(Total for Question 1 is 2 marks)

- 2 Use your calculator to work out  $\frac{67.92 - 13.9}{3.4 \times 9.8}$

Write down all the figures from your calculator display.  
You must give your answer as a decimal.

1.621248499

(Total for Question 2 is 2 marks)

\*3 Wheat biscuits of the same size can be bought in large boxes, medium boxes and small boxes.

A large box costs £3.69 and contains 48 biscuits.

A medium box costs £1.78 and contains 24 biscuits.

A small box costs £1.14 and contains 12 biscuits.

Which size of box is the best value for money?

Explain your answer.

You must show all your working.

$$\text{Large box: } \frac{369}{48} = 7.69 \text{ p/biscuit}$$

$$\text{Medium box: } \frac{178}{24} = 7.42 \text{ p/biscuit}$$

$$\text{Small box: } \frac{114}{12} = 9.5 \text{ p/biscuit.}$$

The biscuits in the medium box are the cheapest per biscuit (= best value)

(Total for Question 3 is 4 marks)

4 (a) Solve  $7(x - 4) = 35$

$$\textcircled{\div 7} \quad x - 4 = \frac{35}{7} = 5$$

$$x = 5 + 4 = 9$$

$$x = \frac{9}{(2)}$$

$$-3 \leq n < 4$$

$n$  is an integer.

(b) Write down the possible values of  $n$ .

$$-3, -2, -1, 0, 1, 2, 3$$

(2)

(c) Solve the inequality  $5x + 3 > 3x - 11$

$$2x + 3 > -11$$

$$2x > -14$$

$$x > -7$$

$$x > -7$$

(2)

(Total for Question 4 is 6 marks)

\*5 Edgar had a maths test and a science test.

He got 68% in the maths test.

He got 36 out of 55 in the science test.

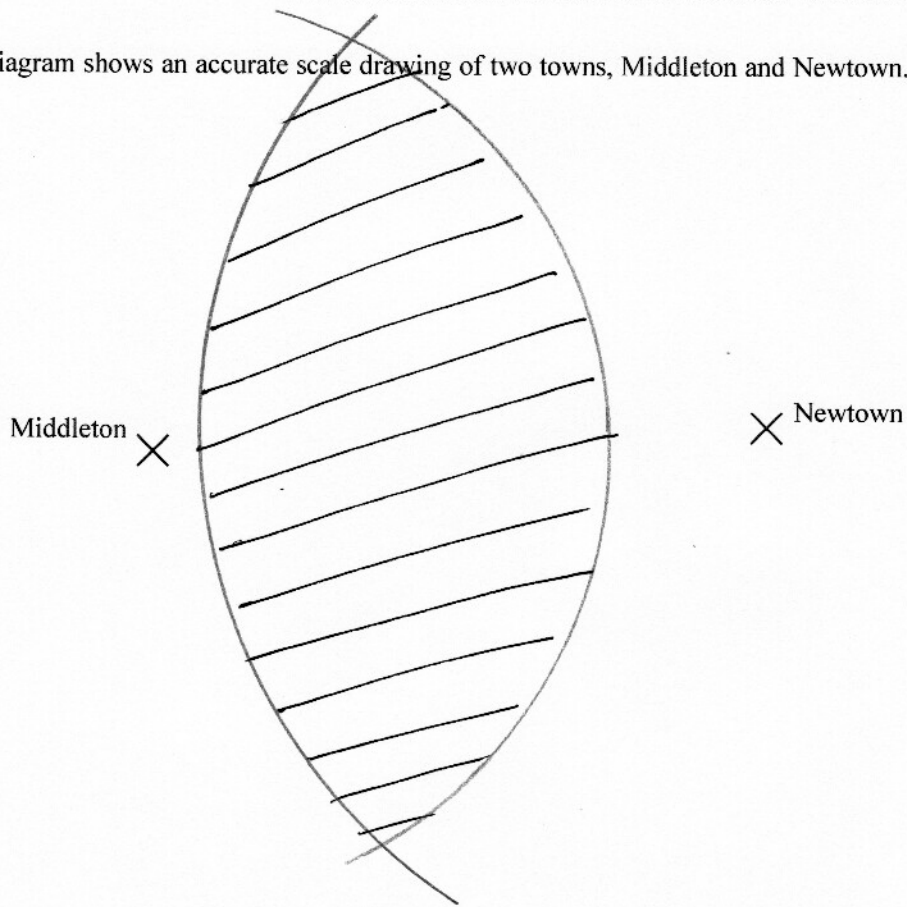
Which test did Edgar get the better mark in, maths or science?

$$\text{In Science, } \frac{36}{55} \times 100\% = 65.45\%$$

$\therefore$  He got his best mark in the maths test

(Total for Question 5 is 3 marks)

- 6 The diagram shows an accurate scale drawing of two towns, Middleton and Newtown.



Scale: 1 cm to 2 km

A new shopping centre is going to be built.  
The shopping centre will be

less than 12 km from Middleton and  
less than 15 km from Newtown.

12 km  $\rightarrow$  6 cm on map  
15 km  $\rightarrow$  7.5 cm on map

On the diagram, shade the region where the shopping centre can be built.

(Total for Question 6 is 3 marks)

- 7 Make  $t$  the subject of the formula  $3t + b = a^2$

$$3t = a^2 - b$$

$$t = \frac{a^2 - b}{3}$$

$$t = \frac{a^2 - b}{3}$$

(Total for Question 7 is 2 marks)



8 The diagram shows a prism.

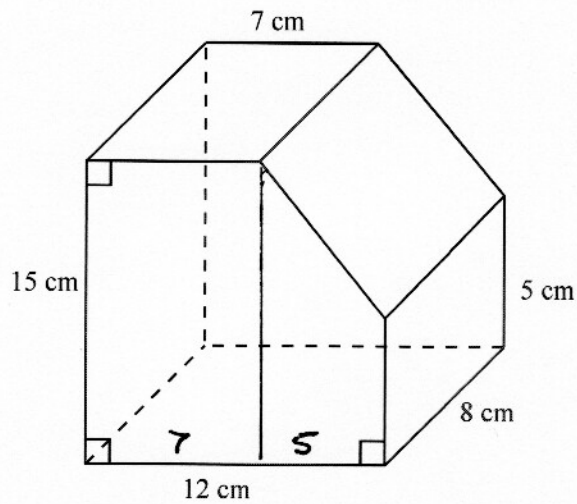


Diagram NOT  
accurately drawn

Work out the volume of the prism.

$$\begin{aligned}\text{Cross-section area} &= \text{rectangle} + \text{trapezium} \\ &= (15 \times 7) + \frac{(15+5) \times 5}{2} \\ &= 105 + 50 = 155 \text{ cm}^2\end{aligned}$$

$$\begin{aligned}\text{Volume} &= \text{cross-section area} \times \text{length} \\ &= 155 \times 8 = 1240 \text{ cm}^3\end{aligned}$$

1240 ..... cm<sup>3</sup>

(Total for Question 8 is 4 marks)

9 The diagram shows the region inside a running track.

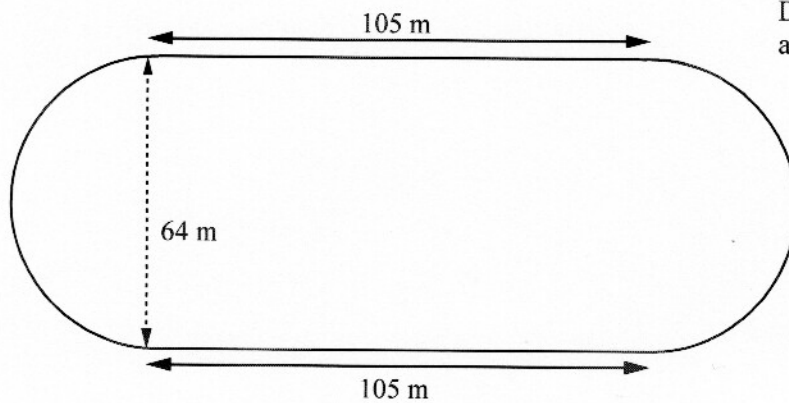


Diagram **NOT** accurately drawn

This region is in the shape of a rectangle with a semi-circle at both ends.

The rectangle has a length of 105 m.  
It has a width of 64 m.

The semi-circles each have a diameter of 64 m.

The groundsman is going to cover this region with grass seed.  
One sack of grass seed will cover  $250 \text{ m}^2$ .

How many sacks of grass seed does the groundsman need?  
You must show all your working.

$$\begin{aligned}
 \text{Area} &= \text{C} + \text{R} + \text{C} && \text{two semi-circles} \\
 & && + \text{a rectangle} \\
 &= 64 \times 105 + \pi \times 32^2 && r = 32 \text{ m } (= 64/2) \\
 &= 64 \times 105 + \pi \times 32^2 = 9937 \text{ m}^2
 \end{aligned}$$

He needs  $\frac{9937}{250} = 39.75$  sacks of seed,  
so he will have to buy 40 sacks.

(Total for Question 9 is 4 marks)

10 The equation  $x^3 + 6x^2 = 500$  has a solution between 6 and 7

Use a trial and improvement method to find this solution.

Give your answer correct to one decimal place.

You must show all your working.

$x$	$x^3 + 6x^2$	
6.5	528.125	too big.
6.25	478.52	too small
6.35	497.98	too small
6.4	507.9	too big

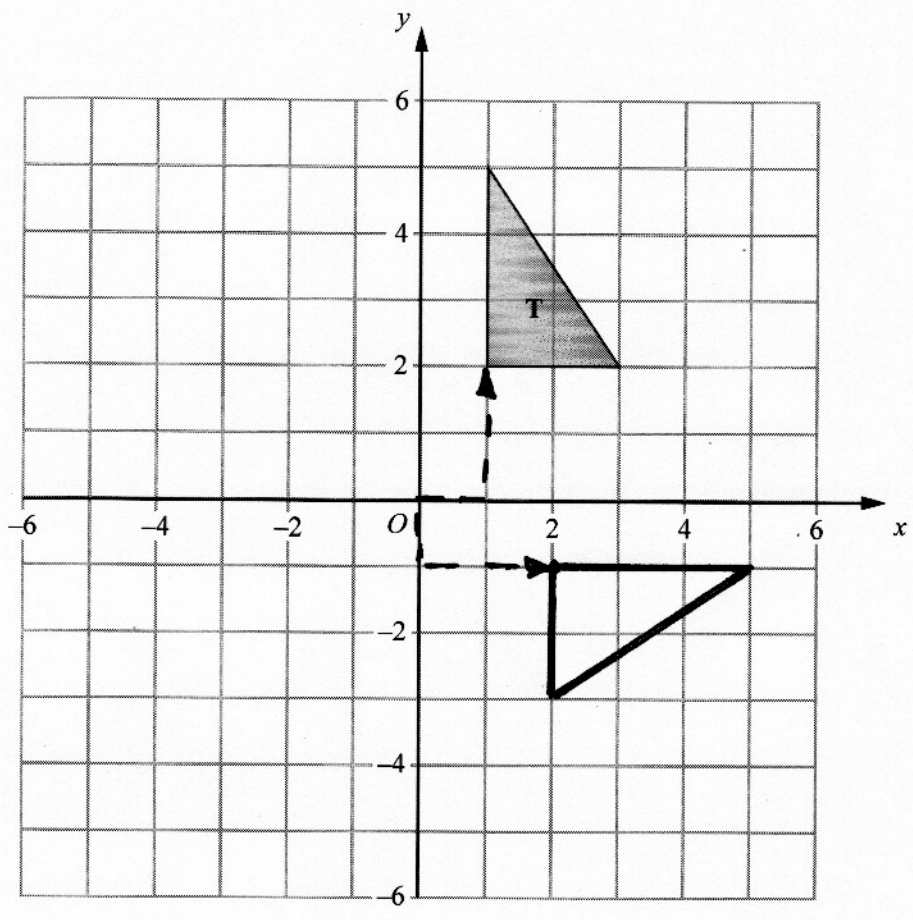
} solution between 6.35 and 6.4, so rounds to 6.4

$$x = 6.4$$

(Total for Question 10 is 4 marks)

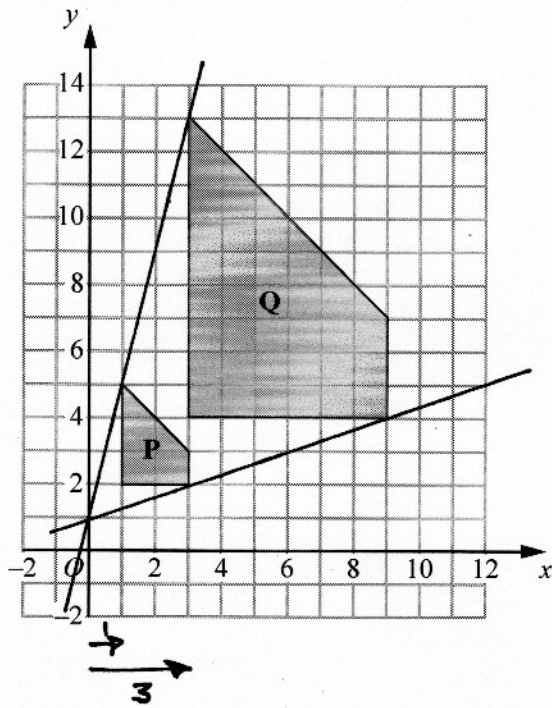


11



(a) Rotate triangle T  $90^\circ$  clockwise about the point  $(0, 0)$ .

(2)



(b) Describe fully the single transformation which maps shape P onto shape Q.

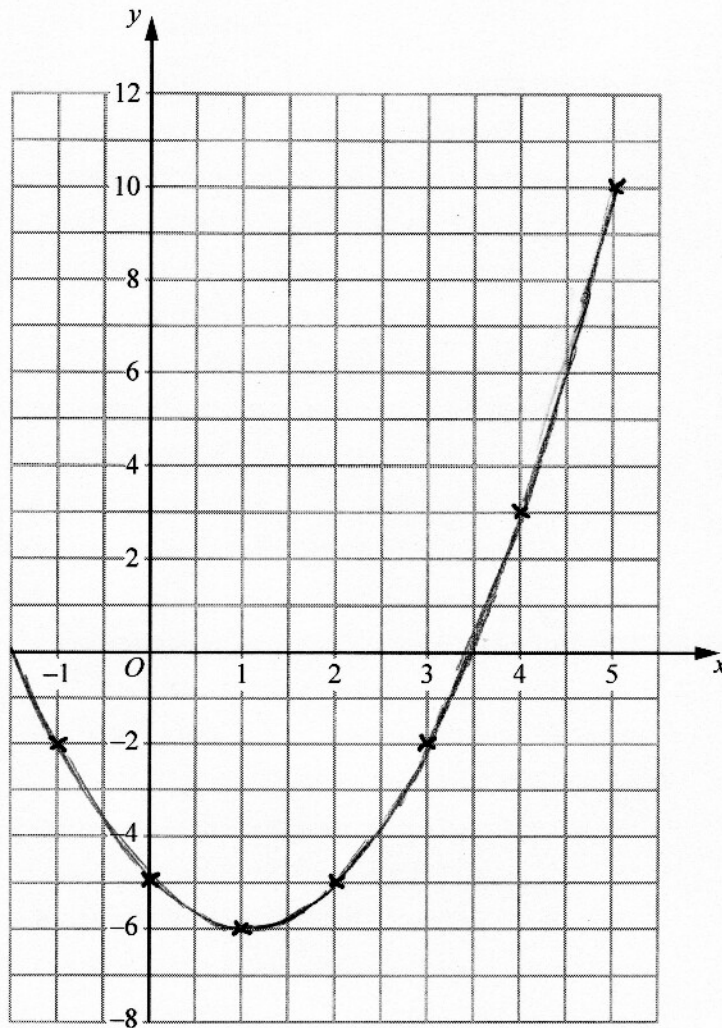
Enlargement, scale factor  $\times 3$ , centre of enlargement  $(0, 1)$ .

(3)

(Total for Question 11 is 5 marks)

12 On the grid, draw the graph of  $y = x^2 - 2x - 5$  for  $-1 \leq x \leq 5$

$x$	-1	0	1	2	3	4	5
$y$	-2	-5	-6	-5	-2	3	10



(Total for Question 12 is 4 marks)

13 The diagram shows a right-angled triangle.

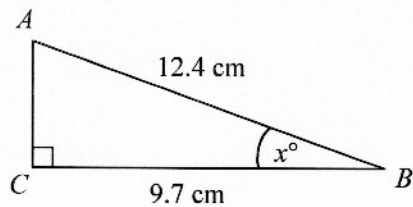


Diagram **NOT**  
accurately drawn

Angle  $ACB = 90^\circ$ .  
 $AB = 12.4$  cm.  
 $CB = 9.7$  cm.

Work out the value of  $x$ .  
Give your answer correct to 1 decimal place.

$$\begin{aligned}\cos(x) &= \frac{9.7}{12.4} & \therefore x &= \cos^{-1}\left(\frac{9.7}{12.4}\right) \\ & & &= 38.532^\circ \\ & & &= 38.5^\circ \text{ to 1 d.p.}\end{aligned}$$

38.5°

(Total for Question 13 is 3 marks)

14 Work out  $5.6 \times 10^8 \times 3 \times 10^{-5}$   
Give your answer in standard form.

$$\begin{aligned}&= 16800 \\ &= 1.68 \times 10^4\end{aligned}$$

(Total for Question 14 is 2 marks)

15 Solve the simultaneous equations.

$$\begin{aligned} 3x + 2y &= 8 \\ 6x - 5y &= 34 \end{aligned}$$

$$\begin{array}{r} \times 2 \rightarrow \\ \rightarrow \\ \hline 6x + 4y = 16 \\ 6x - 5y = 34 \quad - \\ \hline 9y = -18 \\ y = -2 \end{array}$$

↓

$$\begin{aligned} 3x - 4 &= 8, \\ 3x &= 12, \\ x &= 4 \end{aligned}$$

$$\begin{aligned} x &= 4 \\ y &= -2 \end{aligned}$$

(Total for Question 15 is 3 marks)

16 (a) A holiday costs £840 plus 20% VAT.

Calculate the total cost of the holiday.

$$£840 \times 1.2 = £1008$$

$$£ \underline{1008}$$

(3)

In a sale, normal prices are reduced by 45%.  
The sale price of another holiday is £462

(b) Work out the normal price of this holiday.

Reduced by 45%, so paying 55% of the full price P.

$$0.55P = 462$$

$$P = \frac{462}{0.55} = 840$$

$$£ \underline{840}$$

(3)

(Total for Question 16 is 6 marks)



17  $LMN$  is an equilateral triangle.

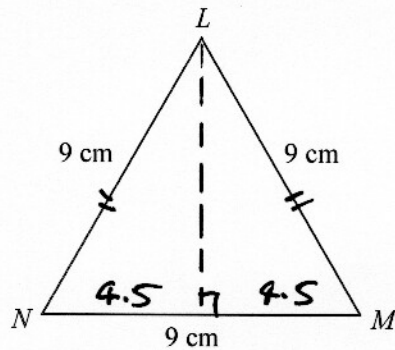


Diagram **NOT**  
accurately drawn

Work out the height of triangle  $LMN$ .

Give your answer correct to 3 significant figures.

Pythagoras:  $h = \sqrt{9^2 - 4.5^2}$   
 $= 7.79423 \text{ cm}$

or  $h = 9 \sin 60 = 7.79423 \text{ cm}$ .

$\rightarrow$  round to  $7.79 \text{ cm}$

7.79.....cm

(Total for Question 17 is 3 marks)

18 Kalinda has two solid cylinders made of the same material.

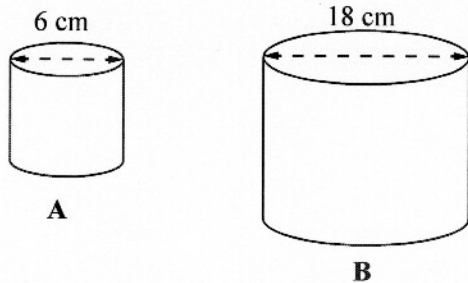


Diagram NOT accurately drawn

The cylinders are mathematically similar.

Cylinder A has a diameter of 6 cm.

Cylinder B has a diameter of 18 cm.

Cylinder A has a mass of 80 g.

Work out the mass of cylinder B.

Same material  $\therefore$  constant density,  
mass  $\propto$  volume.

Geometrically similar  $\therefore$  volume  $\propto$  diameter<sup>3</sup>

$$\text{Mass of B} = \left(\frac{18}{6}\right)^3 \times 80 \text{ g} = 3^3 \times 80 = 2160 \text{ g}$$

(Total for Question 18 is 2 marks)

19 Solve  $5x^2 - 3x - 7 = 0$

Give your solutions correct to 3 significant figures.

This will not factorise, so use  $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$$x = \frac{3 \pm \sqrt{9 + 140}}{10}$$

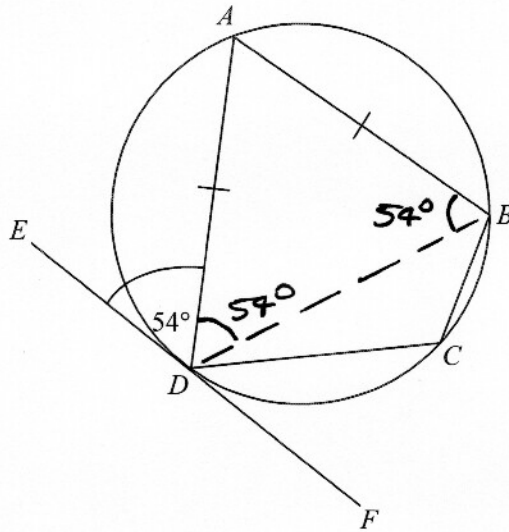
$$\therefore x = \frac{3 - \sqrt{149}}{10} = -0.92066 = -0.921 \text{ to 3 s.f.}$$

$$\text{or } x = \frac{3 + \sqrt{149}}{10} = 1.52066 = 1.52 \text{ to 3 s.f.}$$

$$x = -0.921, 1.52$$

(Total for Question 19 is 3 marks)

Diagram NOT  
accurately drawn



$A, B, C$  and  $D$  are points on the circumference of a circle.  
 $EDF$  is a tangent to the circle.

$AB = AD$ .  
Angle  $ADE = 54^\circ$ .

Work out the size of angle  $BCD$ .  
You must give a reason for each stage in your working.

$\angle ABD = 54^\circ$  (tangent rule, angle of chord  $AD$   
to tangent = angle  $\angle ABD$  on opposite arc).

$AD = AB$  so triangle  $ABD$  is isosceles and  
the base angles  $\angle ABD$  and  $\angle ADB$  are equal.

Either:

(a) Then  $\angle BAD = 180 - 54 - 54 = 72^\circ$  (angles in  
a triangle add to  $180^\circ$ ).

Opposite angles in a cyclic quadrilateral add to  
 $180^\circ$  so  $\angle BAD + \angle BCD = 180$ ,

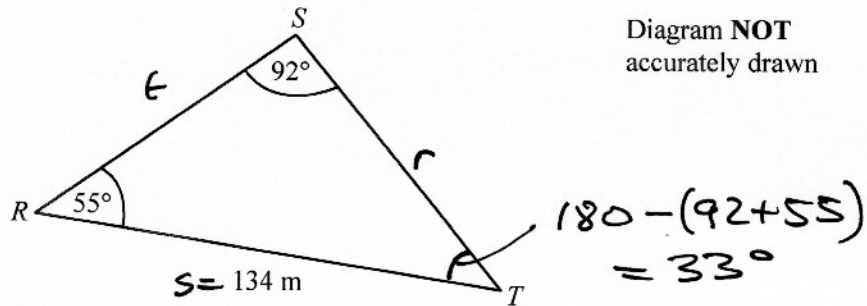
$$\angle BCD = 180 - 72 = \underline{\underline{108^\circ}}$$

or (b) Tangent rule again,  $\angle BDE = 54 + 54 = 108^\circ$   
= angle  $BCD$  in opposite segment,

$$\underline{\underline{\angle BCD = 108^\circ}}$$

(Total for Question 20 is 5 marks)

21 The diagram shows a field.



$RT = 134$  m.  
Angle  $TRS = 55^\circ$ .  
Angle  $RST = 92^\circ$ .

Work out the area of the field.  
Give your answer correct to 3 significant figures.

$$\text{Sine rule, } \frac{r}{\sin 55} = \frac{134}{\sin 92},$$

$$r = \sin 55 \times \frac{134}{\sin 92} = 109.83 \text{ m}$$

$$\begin{aligned} \text{Area} &= \frac{1}{2} ab \sin C = \frac{1}{2} rs \sin(T) \\ &= \frac{1}{2} \times 109.83 \times 134 \times \sin(33) \\ &= 4007.9 \text{ m}^2 \\ &= 4010 \text{ m}^2 \text{ to 3 sig. figures} \end{aligned}$$

4010 m<sup>2</sup>

(Total for Question 21 is 5 marks)

22 Solve the equation

$$\frac{6}{x+2} + \frac{x}{2x-3} = 1$$

$$\times (x+2)(2x-3):$$

$$\frac{6(2x-3)\cancel{(x+2)}}{\cancel{(x+2)}} + \frac{x\cancel{(x+2)}(2x-3)}{\cancel{(2x-3)}} = (x+2)(2x-3)$$

$$12x - 18 + 2x^2 + 2x = 2x^2 - 3x + 4x - 6$$

$$2x^2 + 14x - 18 = 2x^2 + x - 6$$

$$14x - 18 = x + 2x - 6$$

$$-18 = x^2 - 13x - 6$$

$$x^2 - 13x + 12 = 0$$

$$ac = 12 = -1 \times -12 \quad (\text{so } -1 \times -12 = -13 = b)$$

$$(x-1)(x-12) = 0$$

$$\text{check: } x=1, \quad \frac{6}{3} + \frac{1}{-1} = 2-1 = 1 \checkmark$$

$$x=12, \quad \frac{6}{14} + \frac{12}{21} = \frac{3}{7} + \frac{4}{7} = 1 \checkmark$$

$$x=1, \quad x=12$$

(Total for Question 22 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS