edexcel

# GCSE Mathematics Practice Tests: Set 3

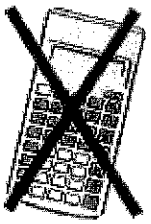
## Paper 1H (Non-calculator)

### Time: 1 hour 30 minutes

You should have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator.

**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 not be used.**
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out.**



**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.*

**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.

**Answer ALL questions.**

**Write your answers in the spaces provided.**

**You must write down all the stages in your working.**

**1.** The equation of a straight line is $y = 4x + 7$

(*a*) Write down the gradient of the line.

4

.....

**(1)**

(*b*) Write down the *y*-intercept of the line.

(0, 7)

.....

**(1)**

**(Total 2 mark)**

---

**2.** Work out $3\frac{1}{8} - 1\frac{2}{3}$

$\frac{25}{8} - \frac{5}{3}$

$= \frac{75}{24} - \frac{40}{24} = \frac{35}{24} = 1\frac{11}{24}$

$1\frac{11}{24}$

.....

**(Total 3 marks)**

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**3.** Here are the ingredients needed to make **8** shortbread biscuits.

| Shortbread biscuits<br>makes **8** biscuits |
|---|
| 120 g butter |
| 60 g caster sugar |
| 180 g flour |

1 biscuit
15g
7.5g
22.5g

Tariq is going to make some shortbread biscuits.
He has the following ingredients

330 g butter  200 g caster sugar  450 g flour

Work out the greatest number of shortbread biscuits that Tariq can make with his ingredients.
You must show all your working.

$\frac{120}{8} = \frac{60}{4} = \frac{30}{2} = 15$

$\frac{60}{8} = \frac{30}{4} = \frac{15}{2} = 7.5$

$\frac{180}{8} = \frac{90}{4} = \frac{45}{2} = 22.5$

$\frac{330}{15} = \frac{110}{5} = 22$ (enough butter for 22)

$\frac{200}{7.5} = \frac{2000}{75} = \frac{400}{15} = \frac{80}{3}$ $3\overline{)80}^{26\,r2}$ (enough sugar for 26)

$\frac{450}{22.5} = \frac{4500}{225} = \frac{900}{45} = \frac{100}{5} = 20$ (enough flour for 20)

20 ..... biscuits

**(Total 3 marks)**

**4.** Railtickets and Cheaptrains are two websites selling train tickets.

Each of the websites adds a credit card charge and a booking fee to the ticket price.

| **Railtickets** |
|---|
| Credit card charge: 2.25% of ticket price |
| Booking fee: 80 pence |

| **Cheaptrains** |
|---|
| Credit card charge: 1.5% of ticket price |
| Booking fee: £1.90 |

Nadia wants to buy a train ticket.
The ticket price is £60 on each website.
Nadia will pay by credit card.

Will it be cheaper for Nadia to buy the train ticket from Railtickets or from Cheaptrains?

Railtickets

1% of £60 = 60p ) ÷4

0.25% of £60 = 15p

2.25% of £60 = 60 + 60 + 15 = £1.35

+ booking fee = £1.35 + £0.80 = £2.15

Cheaptrains

1% of £60 = 60p

0.5% of £60 = 30p

1.5% of £60 = 90p

+ booking fee = £1.90 + £0.90 = £2.80

Railtickets is cheaper

**(Total 4 marks)**

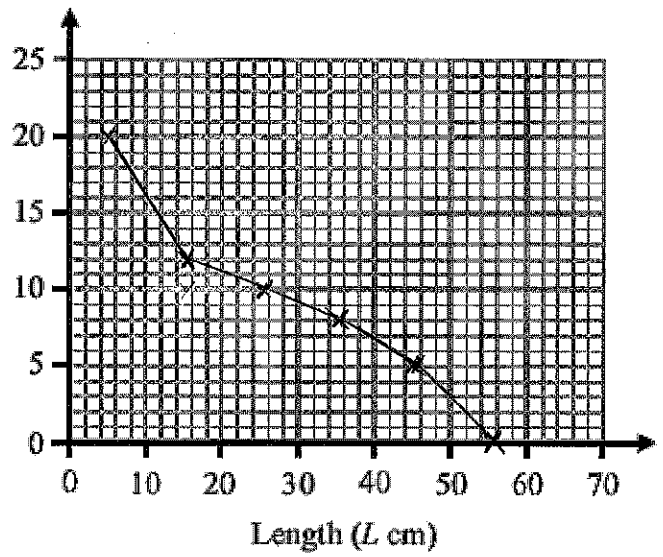
**5.** The table gives information about the lengths of the branches on a bush.

| Length($L$cm) | Frequency |
|---|---|
| $0 \leq L < 10$ | 20 |
| $10 \leq L < 20$ | 12 |
| $20 \leq L < 30$ | 10 |
| $30 \leq L < 40$ | 8 |
| $40 \leq L < 50$ | 6 |
| $50 \leq L < 60$ | 0 |

(*a*) Draw a frequency polygon to show this information.

Plot at middle of groups.

Join with straight lines




**(2)**

(*b*) Work out the total number of branches on the bush.

$20+12+10+8+6+0$

$= 56$

56

**(2)**

(*c*) Write down the modal class interval.

Highest frequency group

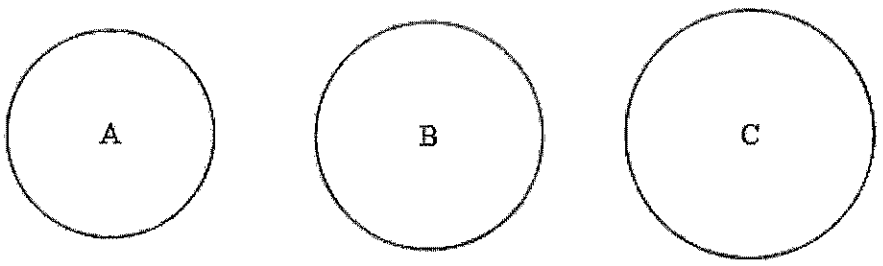
$0 \leq L < 10$

**(1)**

**(Total 5 marks)**

**6.** Here are three circles A, B and C.

**Diagrams NOT accurately drawn**




The area of circle A is 200 cm$^2$.

The area of circle B is 10% larger than the area of circle A.

The area of circle C is 10% larger than the area of circle B.

How much larger is the area of circle C than the area of circle A?

10% of 200 = 20

Circle B = 220 cm$^2$

10% of 220 = 22

Circle C = 242 cm$^2$

242 − 200

= 42 cm$^2$

**(Total 4 marks)**

**7.** (*a*) Expand and simplify $2(x + 3y) + 4(x - y)$

$2x + 6y + 4x - 4y$

$= 6x + 2y$

$6x + 2y$

**(2)**

(*b*) Factorise completely $8p - 12pq$

$4p(2 - 3q)$

$4p(2 - 3q)$

**(2)**

**(Total 4 marks)**

**8.** The diagram shows a triangle.

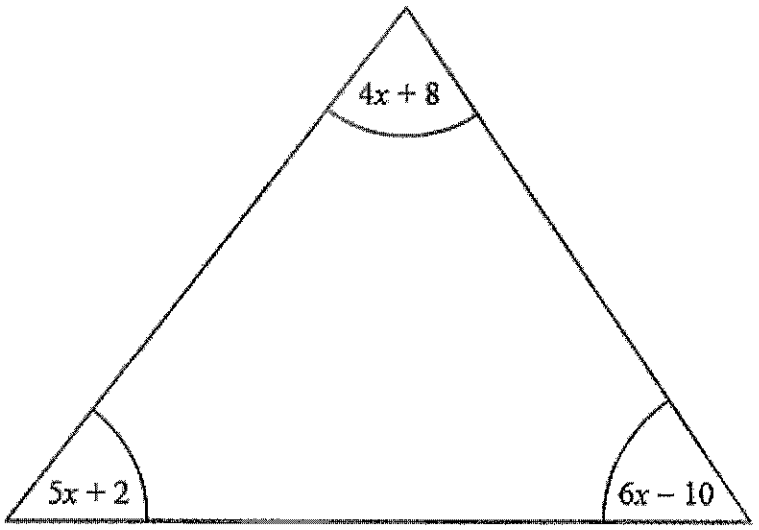



Diagram **NOT** accurately drawn

All the angles are measured in degrees.

Show that the triangle is isosceles.

Angles add to 180

$5x + 2 + 6x - 10 + 4x + 8 = 180$

$15x = 180$

$x = \frac{180}{15} = \frac{60}{5} = 12$

If $x = 12$

$4x + 8 = 4 \times 12 + 8 = 56$

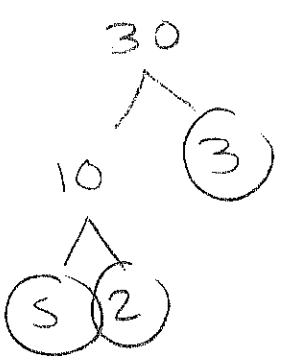
$5x + 2 = 5 \times 12 + 2 = 62$ ✓

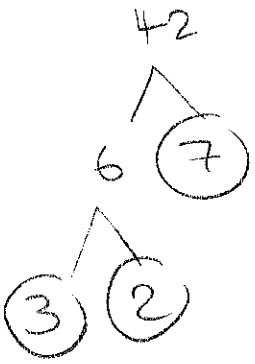
$6x - 10 = 6 \times 12 - 10 = 62$ ✓

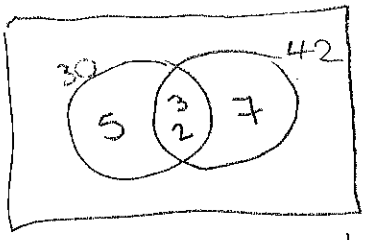
2 angles are the same so triangle is isosceles

**(Total 5 marks)**

**9.** (*a*) Find the Highest Common Factor (HCF) of 30 and 42.



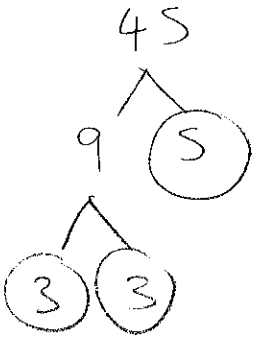



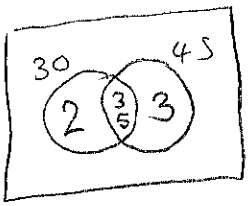

HCF = intersection
= 3 × 2 = 6

6

**(2)**

(*b*) Find the Lowest Common Multiple (LCM) of 30 and 45.




LCM
= 2 × 3 × 5 × 3 = 6 × 15 = 90

90

**(2)**

**(Total 4 marks)**

**10.**

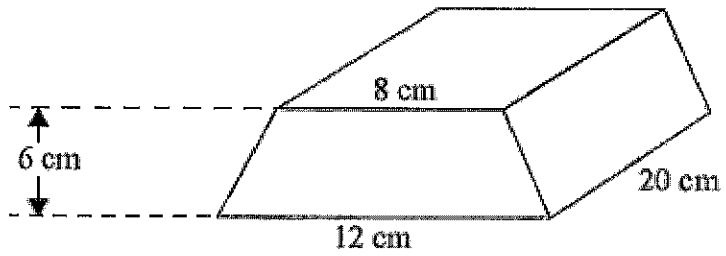



Diagram **NOT** accurately drawn

The diagram shows a solid prism made from metal.
The cross-section of the prism is a trapezium.

The parallel sides of the trapezium are 8 cm and 12 cm.
The height of the trapezium is 6 cm.
The length of the prism is 20 cm.

The density of the metal is 5 g/cm$^3$.

Calculate the mass of the prism.
Give your answer in kilograms.

Volume = cross sectional area x length

Area trapezium

$= \frac{(8+12)\times 6}{2} = \frac{20\times 6}{2} = \frac{120}{2} = 60$

Volume = $60 \times 20$

$= 1200\ cm^3$

Density = $5g/cm^3$ ⇒ each $cm^3$ weighs 5g

Mass = $1200 \times 5 = 6000g = 6kg$

6

..... kg

**(Total 5 marks)**

**11.** (*a*) Write down the value of $25^0$

1

.....

**(1)**

(*b*) Write down the value of $49^{-\frac{1}{2}}$

$49^{-\frac{1}{2}} = \frac{1}{49^{\frac{1}{2}}} = \frac{1}{\sqrt{49}} = \frac{1}{7}$

$\frac{1}{7}$

.....

**(1)**

(*c*) Write as a power of 2 $\frac{4 \times 8}{16^3}$

$4 = 2^2$

$8 = 2^3$

$16 = 2^4$

$\frac{2^2 \times 2^3}{(2^4)^3} = \frac{2^5}{2^{12}} = 2^{-7}$

$2^{-7}$

.....

**(3)**

**(Total 5 marks)**

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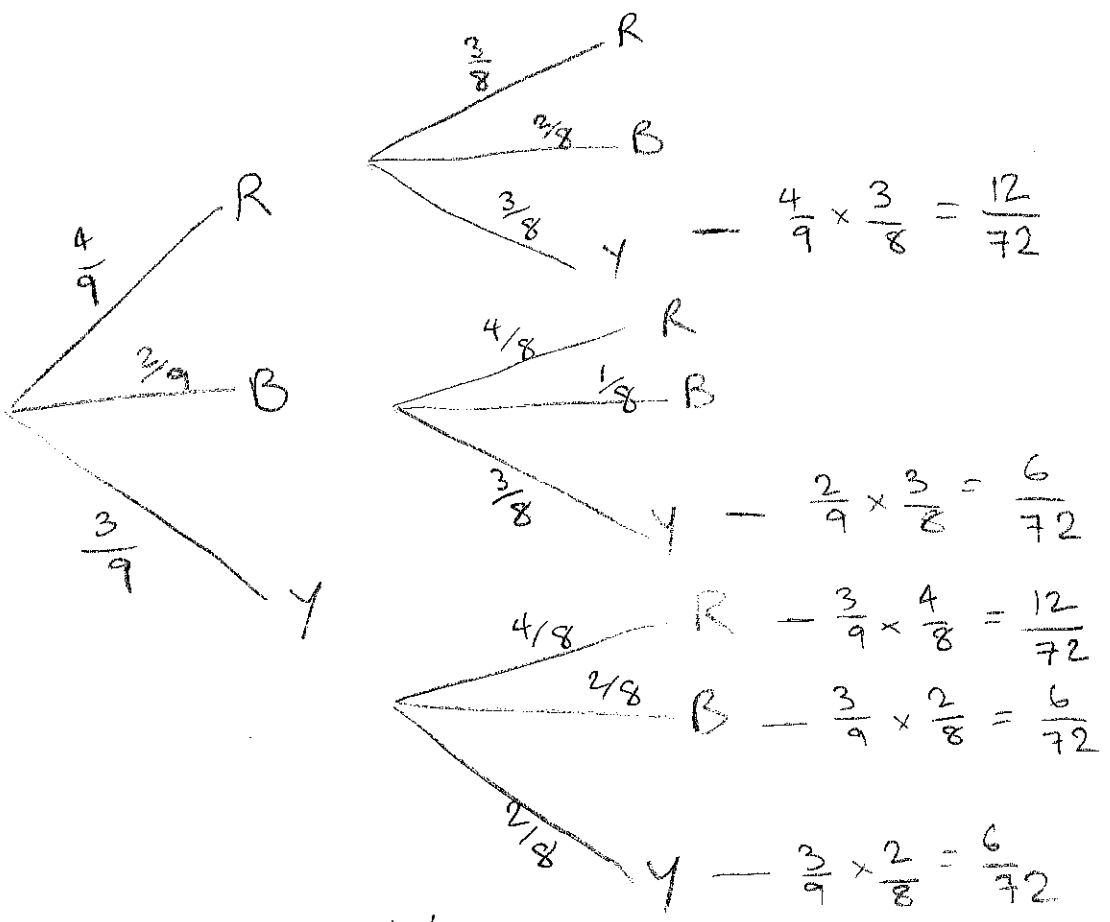
**12.** There are 9 counters in a box.

4 of the counters are red.
2 of the counters are blue.
3 of the counters are yellow.

Pavinder takes at random two counters from the box.

Work out the probability that he takes at least one yellow counter.




Total = $\frac{12 + 6 + 12 + 6 + 6}{72} = \frac{42}{72} = \frac{7}{12}$

7/12

**(Total 4 marks)**

**13.** Simplify fully $\dfrac{2x^2-7x+3}{x^2-9}$

$2x^2-7x+3 = (2x-1)(x-3)$

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

$$\frac{(2x-1)(x-3)}{(x+3)(x-3)}$$

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

**(Total 3 marks)**

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**14.** Work out $(2+\sqrt{3})(2-\sqrt{3})$
Give your answer in its simplest form.

| x | 2 | $\sqrt{3}$ |
|---|---|---|
| 2 | 4 | $2\sqrt{3}$ |
| $-\sqrt{3}$ | $-2\sqrt{3}$ | $-3$ |

$4-3=1$

$2\sqrt{3}-2\sqrt{3}=0$

$1+0=1$

1

**(Total 2 marks)**

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**15.**

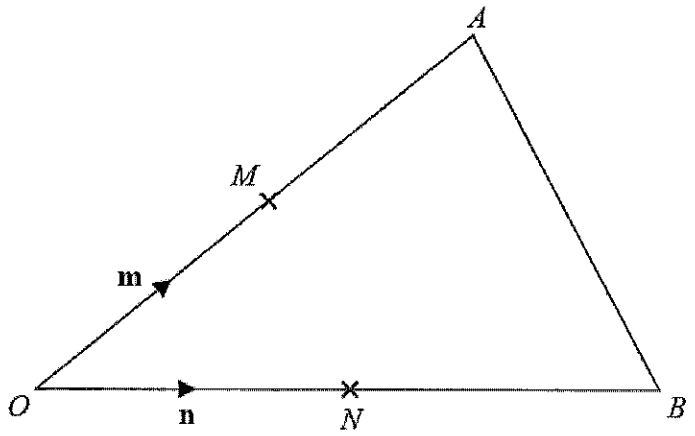



Diagram **NOT** accurately drawn

*OAB* is a triangle.
*M* is the midpoint of *OA*.
*N* is the midpoint of *OB*.

$\overrightarrow{OM} = \mathbf{m}$

$\overrightarrow{ON} = \mathbf{n}$

Show that *AB* is parallel to *MN*.

$\overrightarrow{MN} = -\underline{m} + \underline{n} = \underline{n} - \underline{m}$

$\overrightarrow{OA} = 2\underline{m}$

$\overrightarrow{OB} = 2\underline{n}$

$\overrightarrow{AB} = -2\underline{m} + 2\underline{n} = 2\underline{n} - 2\underline{m} = 2(\underline{n} - \underline{m})$

$\overrightarrow{AB}$ & $\overrightarrow{MN}$ are parallel since one is a scalar multiple of the other

**(Total 3 marks)**

**16.**

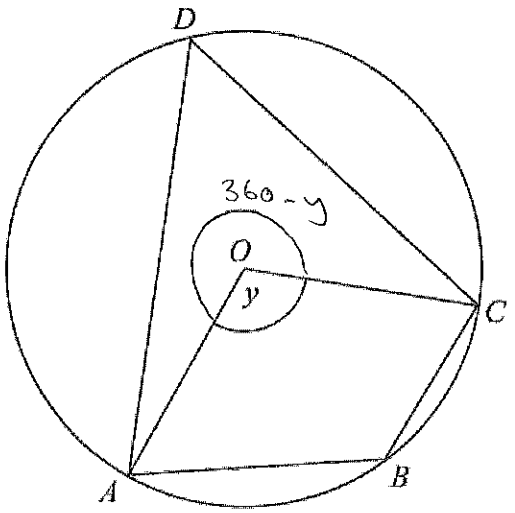



Diagram **NOT** accurately drawn

*A*, *B*, *C* and *D* are points on the circumference of a circle, centre *O*.

Angle *AOC* = *y*.

Find the size of angle *ABC* in terms of *y*.
Give a reason for each stage of your working.

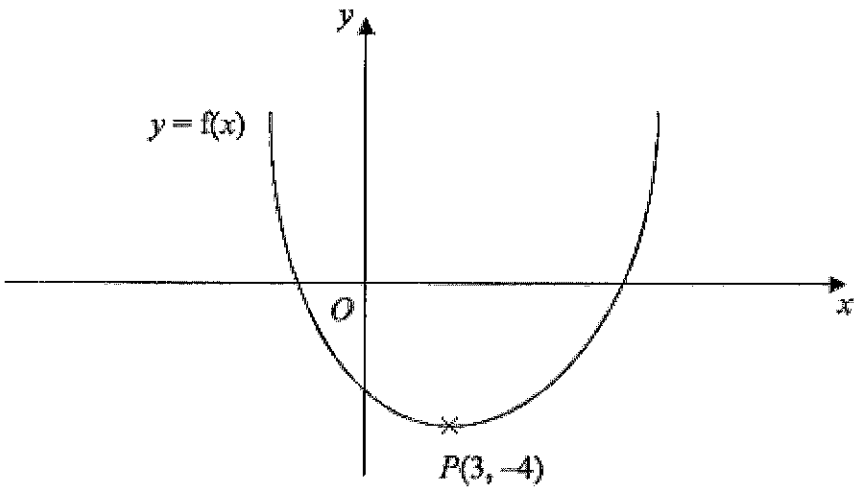
At $A\hat{O}C$ the reflex angle (marked on diagram) $= 360 - y$ (angles round a point add to 360)

$A\hat{B}C = \frac{1}{2}$ reflex angle $A\hat{O}C$ (angle at centre is twice angle at circumference)

$A\hat{B}C = \frac{360 - y}{2} = 180 - \frac{y}{2}$

**(Total 4 marks)**

**17.** This is a sketch of the curve with the equation $y = f(x)$.
The only minimum point of the curve is at $P(3, -4)$.




(*a*) Write down the coordinates of the minimum point of the curve with the equation $y = f(x - 2)$.

↘ moves 2 places right

(5 , –4)

**(2)**

(*b*) Write down the coordinates of the minimum point of the curve with the equation $y = f(x + 5) + 6$

↑ 5 left ↖ up 6

3 – 5 = –2

– 4 + 6 = 2

(–2 , 2)

**(2)**

**(Total 4 marks)**

**18.**

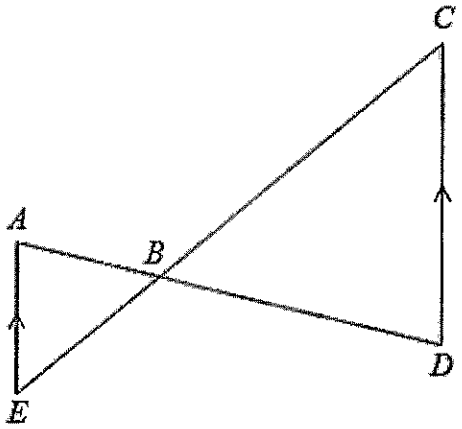



Diagram **NOT** accurately drawn

*AE* is parallel to *CD*.
*ABD* and *EBC* are straight lines.

Prove that triangle *ABE* is similar to triangle *DBC*.
Give reasons for each stage of your proof.

$A\hat{B}E = C\hat{B}D$ (vertically opposite angles are equal)

$B\hat{A}E = B\hat{D}C$ (alternate angles are equal)

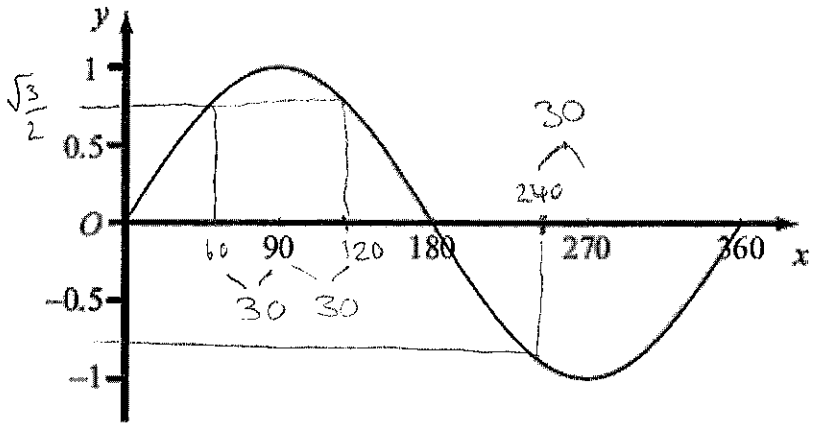
$B\hat{E}A = B\hat{C}D$ (alternate angles are equal)

The 2 triangles contain the same angles

So they are similar

**(Total 4 marks)**

**19.** The diagram shows a sketch of the curve $y = \sin x°$ for $0 \leq x \leq 360$




The exact value of $\sin 60° = \dfrac{\sqrt{3}}{2}$

(*a*) Write down the exact value of

(i) $\sin 120°$,

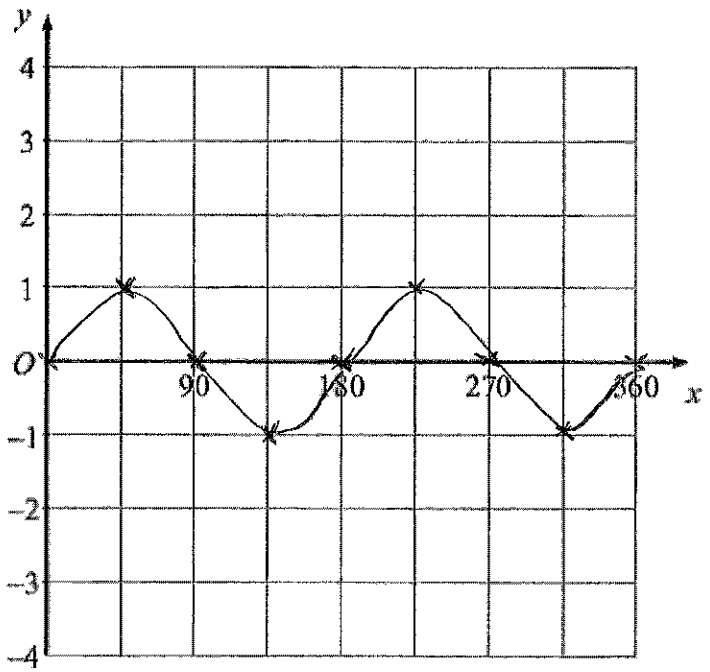
$\frac{\sqrt{3}}{2}$

(ii) $\sin 240°$.

$-\frac{\sqrt{3}}{2}$

**(2)**

(*b*) On the grid below, sketch the graph of $y = \sin 2x°$ for $0 \leq x \leq 360$




If $x = 45$
$y = \sin 90 = 1$

If $x = 90$
$y = \sin 180 = 0$

If $x = 135$
$y = \sin 270 = -1$

If $x = 180$
$y = \sin 360 = 0$

**(2)**

**(Total 4 marks)**

subtract

**20.** Prove algebraically that the difference between the squares of any two consecutive integers is equal to the sum of these two integers.

add

next to each other

n , n+1

Need to show

$(n+1)^2 - n^2 = n + n + 1 = 2n+1$

$(n+1)(n+1) - n^2$

$= n^2 + 2n + 1 - n^2$

$= 2n + 1$

as required

**(Total 4 marks)**

**21** Sketch the graph of $f(x) = -x^2 - 3x + 5$, showing the coordinates of the turning point and the coordinates of any intercepts with the coordinate axes.

$-x^2 \Rightarrow$ sad face graph

y intercept where $x = 0$, $y = 5$

crosses x axis where $-x^2 - 3x + 5 = 0$

or $x^2 + 3x - 5 = 0$

Quadratic formula

$$x = \frac{-3 \pm \sqrt{3^2 - 4 \times 1 \times -5}}{2} = \frac{-3 \pm \sqrt{29}}{2}$$

5 and a bit

Turning point: complete square

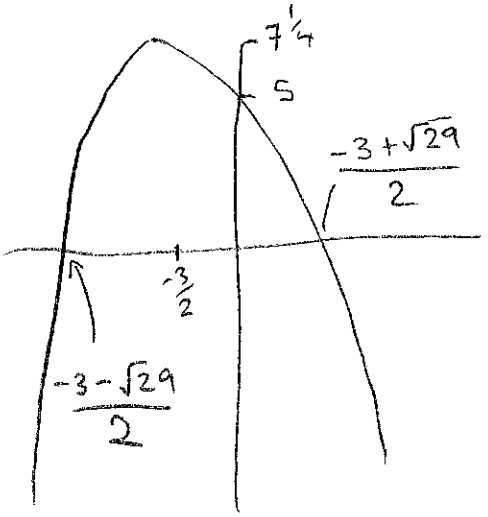
$$f(x) = -(x^2 + 3x) + 5$$

$$= -\left(\left(x + \frac{3}{2}\right)^2 - \frac{9}{4}\right) + 5$$

$$= -\left(x + \frac{3}{2}\right)^2 + \frac{9}{4} + 5$$

x coord of turning point $= \frac{-3}{2}$

y coord of tp is $5 + \frac{9}{4} = 7\frac{1}{4}$




**(Total 4 mark)**

**TOTAL FOR PAPER IS 80 MARKS**