AQA

Practice Paper 1

Please write clearly in block capitals.

Centre number ☐☐☐☐☐   Candidate number ☐☐☐☐

Surname   *Answers.*

Forename(s)

Candidate signature

GCSE
Mathematics

H

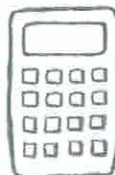Higher   Paper 3   Calculator

Summer 2018   Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
*   a calculator
*   mathematical instruments.

Instructions

*   Use black ink or black ball-point pen. Draw diagrams in pencil.
*   Answer **all** questions.
*   You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
*   Do all rough work in this book. Cross through any work you do not want to be marked.

Information

*   The marks for questions are shown in brackets.
*   The maximum mark for this paper is 80.
*   You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to the answer book.

Advice

*   In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Pages	Mark
3	
4 - 5	
6 – 7	
8 – 9	
10 – 11	
12 – 13	
14 – 15	
16 – 17	
18 – 19	
20 – 21	
22 – 23	
TOTAL	

Teacher		Class		8300/MissB/3H

www.missbsresources.com

Practice Paper Overview

Q	Topic	Mark	Total
1	Multipliers		1
2	Quadratic Equations and Roots		1
3	Nth Term Rule		1
4	Laws of Indices		1
5	Percentage increase and Decrease		3
6	Angles on Parallel Lines		3
7	Averages from a Grouped Table		4
8	Expand Triple Brackets		3
9	Pressure		2
10	Probability and Algebra		4
11	Product of Prime Factors		2
12	Trigonometry		2
13	Equation of a Line		1
14	Area Problem		4
15	Pie Chart		3
16	Form and Solve Equations		4
17	Compound and Simple Interest		4
18	Perimeter of a Sector		3
19	Equation of a Parallel Line		3
20	Product Rule for Counting		2
21	Calculating with Standard Form		2
22	Recognising Graphs		1
23	Circle Theorems		5
24	Quadratic Formula		3
25	Ratio Problem		3
26	Histogram		3
27	Speed, Distance and Time		4
28	Algebraic Fraction		4
29	Quadratic Inequality		4
	Total		**80**

Answer **all** questions in the spaces provided.

1 Circle the equation that increases 500 by 1.2%.

$100\% + 1.2\% = 101.2\%$ **[1 mark]**

500 × 1.2   500 × 1.02   500 × 1.12   (500 × 1.012)

2 Circle the equation with roots -3 and 6. $(x+3)(x-6) = 0$ **[1 mark]**

$(x - 3)(x + 6) = 0$ $x^2 - 18 = 0$

$(x + 3)(x - 6) = 0$ $(x + 3)^2 - 6 = 0$

3 Here is a sequence

27   19   11   3   −5

−8   −8   −8   −8

Circle the expression for the nth term of the sequence. **[1 mark]**

8n − 19   27 − 8n   n − 8   (35 − 8n)

Not −8   −8n

4 Work out $(4x^2)^3$ and circle your answer. **[1 mark]**

(64x^6) $8x^5$ $16x^6$ $12x^6$

$4x^2 \times 4x^2 \times 4x^2$

$64x^6$

Do not write outside the box

5   A company makes bags of dog food.

A bag usually contains 5.5kg of food.

Here are two option for a special offer.

Option A	Option B
Usual amount of food. 20% off the price.	15% more food. Price remains the same.

Which option is the better value for the customer?

You must show your working. **[3 marks]**

<u>A</u>

80% of $\frac{x}{x}$ = 5.5kg

Amount of food. $\boxed{5500g}$

<u>B</u>

$5.5kg + 15\%$

$\boxed{= 6325g}$ ✓

Assume the price was £10.

80% of £10 is £8

So £8 = 5500g^k

compare per gram (kilo)

$8 \div 5500$ ✓

1kg = £1.454545... – p/gkg

e £10 = 6.325^k g

$10 \div 6.325$

1kg = £1.5810 – p/kg

Answer _____ Option A   by 13p per Kg ✓

6 AB is parallel to CD.

A ——————— E ——————————— B

115°

x

Not drawn accurately

←180−(90+55)
(Triangle)

60°
115°
55°

C ——————— F ——————————— D
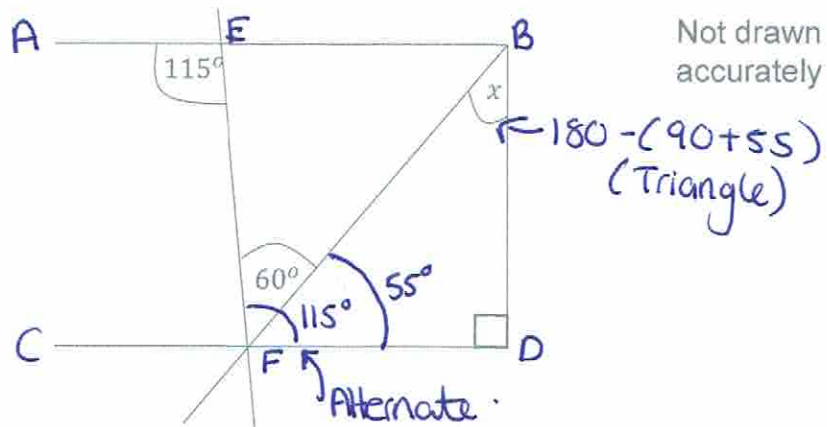
Alternate.

Show that angle $x = 35°$

[3 marks]

Angle AEF = EFD (Alternate angles) ✓

Angle BFD = 115 − 60 = 55° ✓

Angle ~~FBD~~ DBF = 180 − (90+55) (Angles in a triangle) ✓
= 180 − 145
$x = 35°$

Answer _____ So $x = 35°$ _____

Turn over ▶

8400/MissB/3H

7   Here is some information about the number of hours of revision year 11
    students did the night before their maths exam.
    One of the frequencies is missing.

Number of hours (t, hours)	Frequency	Midpoint	Fx
$0 \le t < 1$	14	0.5	7
$1 \le t < 2$	28	1.5	42
$2 \le t < 4$	x ✗	3	= ? $3x$ ✓
$4 \le t < 8$	15	6	90

$x+57$ ✓   or $3x+139$ ✓

Midpoints are used to work out an estimate for the mean number of ~~books read.~~ revision hours.

$7+42+90 = 139$

The answer is 2.6

Work out the missing frequency.   [4 marks]

$$\frac{3x+139}{(x+57)} = 2.6 \checkmark$$

(level it)

$3x+139 = 2.6(x+57)$

$3x+139 = 2.6x+148.2$

$0.4x+139 = 148.2$

$0.4x = 9.2$

$x = \frac{9.2}{0.4}$

$x = 23$ ✓

Answer   23

8 Expand and simplify

$$(2x + 4)(x - 3)(3x + 5)$$

$(2x+4)(3x^2 - 4x - 15)$ **[3 marks]**

	$3x$	$+5$
x	$3x^2$	$+5x$
-3	$-9x$	-15	✓

	$3x^2$	$-4x$	-15
$2x$	$6x^3$	$-8x^2$	$-30x$
$+4$	$+12x^2$	$-16x$	-60	✓

$= 3x^2 - 4x - 15$

$6x^3 - 8x^2 + 12x^2 - 30x - 16x - 60$

Answer $6x^3 + 4x^2 - 46x - 60$ ✓

9

$$Pressure = \frac{force}{area}$$

Find the pressure exerted by a force of 1125 newtons on $75cm^2$.

Give your answer in newtons/m^2 **[2 marks]**

$P = \dfrac{1125}{75} = 15$ newtons/CM^2 ✓M1

(or)

☐ 1M=100cm but. $75cm^2 \div 10000 = 0.0075 m^2$ ✓M1

1M=100cm

So 1M²=100cm × 100cm $\dfrac{1125}{0.0075} = 150\,000$ Newtons/m^2

1M² = 10000cm²

✓A1

Answer _____ 150 000 _____ newtons/m^2

9

10 A box contains counters.

	Green	Blue	Purple	Black
Number of counters	$\underline{16}$ +	$2x - 3$ +	$2x + 5$ +	$x + 2$ = 100

A counter is chosen at random.

The probability it is green is $\frac{8}{50}$. $= \frac{16}{100} \rightarrow$ Total Frequency

Work out the probability it is purple.
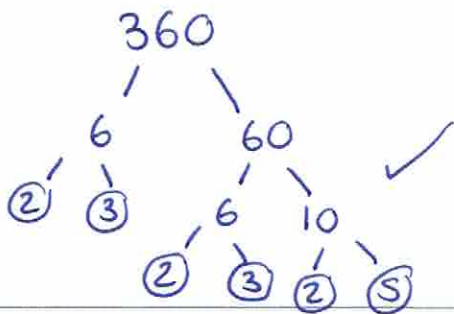
[4 marks]

$5x + 20 = 100$ ✓

$5x = 80$

$x = 16$ ✓

$Purple = 2(16) + 5$

$= 37$ ✓

Answer $\quad 37/100$ ✓

11 Express 360 as a product of its prime factors in index form.

[2 marks]

360

6 — 60

② ③ 6 10

② ③ ② ⑤ ✓

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

Answer $2^3 \times 3^2 \times 5$ ✓

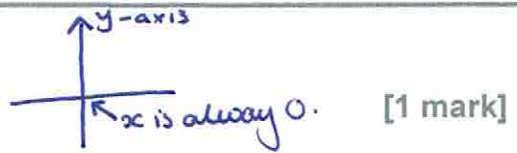**12** Calculate the size of the angle marked x.

Not drawn accurately

$S^o_h \left(C^a_n\right) T^o_a$

h

12.3 cm

x

6.5 cm

a

[2 marks]

O
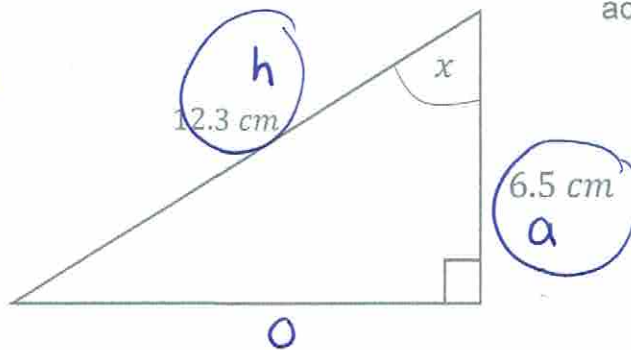
$\cos x = \dfrac{6.5}{12.3}$

$x = \cos^{-1}\left(\dfrac{6.5}{12.3}\right)$ ✓

$x = 58.098856\ldots$

Answer $58.1°$ ✓

8

13 Circle the equation of the $y - axis$.

↑y-axis

↖x is always 0.

[1 mark]

$\boxed{x = 0}$ $y - x = 0$ $y = x$ $y = 0$ $y + x = 0$

14 The diagram shows a garden.

8 m

Not drawn
accurately

Patio

Grass

h

7 m

hidden
Pythag

2 m

10 m

2
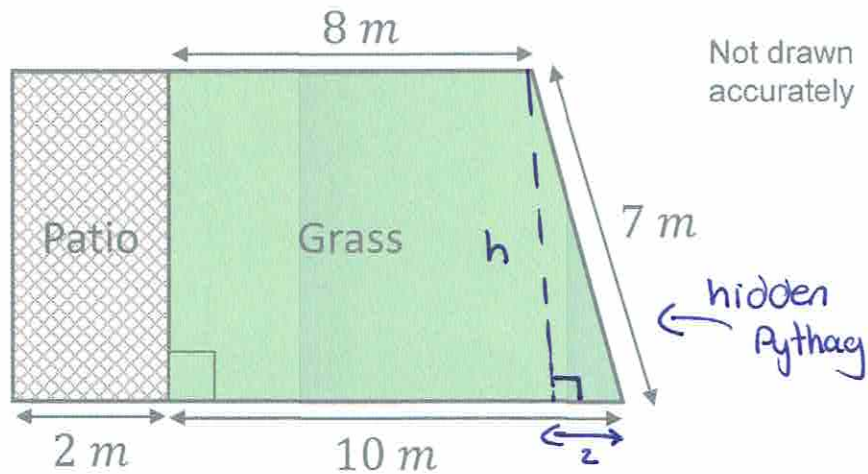
Work out the proportion of the garden area which is covered in grass.

[4 marks]

$h = \sqrt{7^2 - 2^2}$

$= \sqrt{45}$

$= 6.708.... \, m$

Area Patio $= 6.708... \times 2$

$= 13.4164.... m^2$

Area grass $= \dfrac{10 + 8 \times 6.708....}{2}$

$= 60.3738... m^2$

Total area $= 73.79....$

Proportion garden
that is grass

$\dfrac{60.37}{73.79} \times 100$

$= 81.8\%$

Answer   81.8% grass

Do not write
outside the
box

15 The pie chart shows the attendance of males and females at a pop concert.

(Pie chart with handwritten annotations: "Same", "150°", "Female", "150°", "Male", "60°", "More", "7740", "60° = 7740 people")
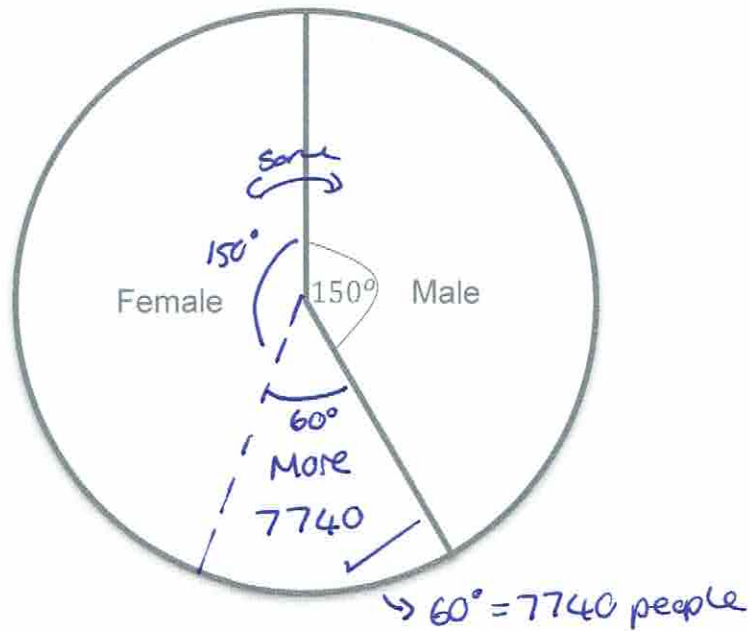
7740 more females attended than males.

Calculate how many people attended the concert in total.

[3 marks]

Magic Number (degrees per person) = 7740 ÷ 60
                                   = 129° ✓

129 × 360° = 46440 ✓

Answer _____ 46440 ✓

8

16 This is a rectangle.

Each length is measured in centimetres.

$3(x + 5)$

Not drawn accurately

$2x$

$2x$

$2(13.5) = 27 \text{cm}$

$5x - 12$

$5(13.5) - 12 = 55.5 \text{cm}$
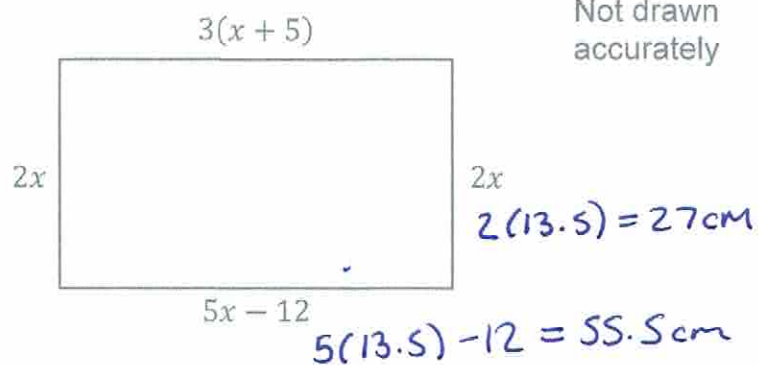
Work out the area of the rectangle.

[4 marks]

$$5x - 12 = 3(x + 5) \checkmark$$

$$5x - 12 = 3x + 15$$

$$-3x \qquad -3x$$

$$2x - 12 = 15$$

$$+12 \quad +12$$

$$2x = 27$$

$$x = \cancel{13.5} \; 13.5 \checkmark$$

$\checkmark$

Area 55.5×27

Answer 1498.5cm^2

17 The value of a house £V is given by

$$V = 125\,000 \times 1.004^t$$

17 (a) Write down the value of the house when $t = 0$

[1 mark]

$$125000 \times 1.004^0$$

Answer _____ 1 2 5000 ✓

17(b) What is the value of the house after 4 years?

[1 mark]

$$125000 \times 1.004^4$$

Answer _____ £127012.03 ✓

17 (c) After how many years will the house's value be above £130 000

[2 marks]

5 years = £127 520.08
6 years = £128 030.16
7 years = £128 542.28
8 years = £129056.45
9 years = £129 572.68 ✓
10 years = £130090.97

Answer _____ 10 years . ✓

8

18 Calculate the perimeter of the sector.

r=7cm   d=14cm

$C = \pi D$

Arc Length = $\frac{\theta}{360} \times \pi D$

7 cm

120°

7 cm
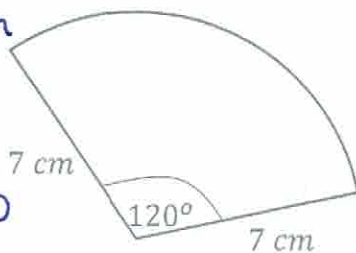
Not drawn accurately

[3 marks]

Perimeter = Arc + radius + radius

Arc = $\frac{120}{360} \times \pi \times 14$

= 14.6607....

P = 14.6607... + 7 + 7

= 28.6607...·

Answer 28.7cm

19 Work out the equation of the line that is parallel to the line
$y = 4x - 5$ and passes through $(-3, -2)$.

x y

[3 marks]

m=4 parallel stays the same

$y = 4x + c$

$-2 = 4(-3) + c$

$-2 = -12 + c$

$c = -2 + 12 = 10$

Answer $y = 4x + 10$

20 Students on a school trip to an escape room.

To escape the escape room they need a 4 digit code.

Each digit is a number from 0 to 9.

1			

They know that the first digit is one.

The second digit is even. 0,2,4,6,8 (5 options)

The third digit is prime. 2,3,5,7 (4 options)

The final number is a square number. (1,4,9) 3 options
(0,1,4,9) 4 options

How many potential combinations are there?

[2 marks]

$5 \times 4 \times 3 = 60$ ✓ ✓

$5 \times 4 \times 4 = 80$

Answer _____

21 Find in standard form the value of

$$(4 \times 10^6) \times (5 \times 10^{-3})$$

[2 marks]

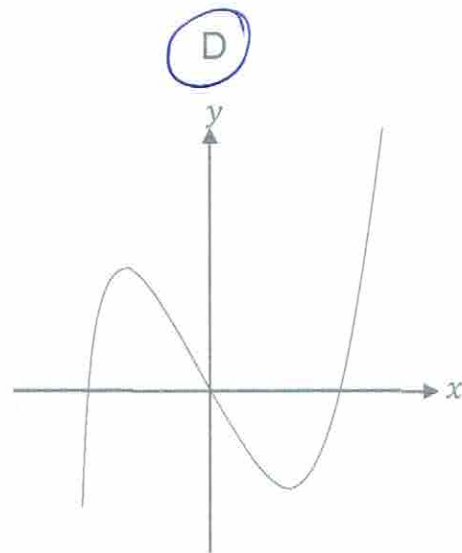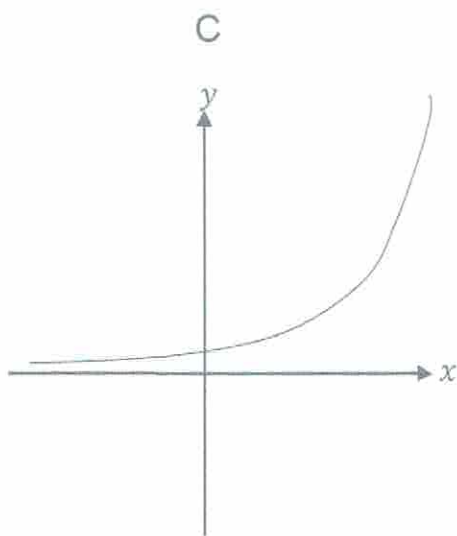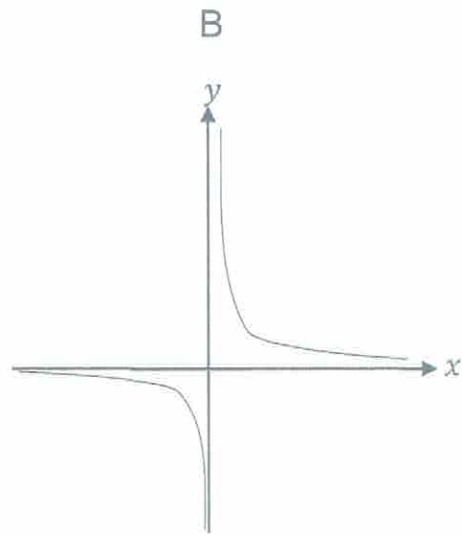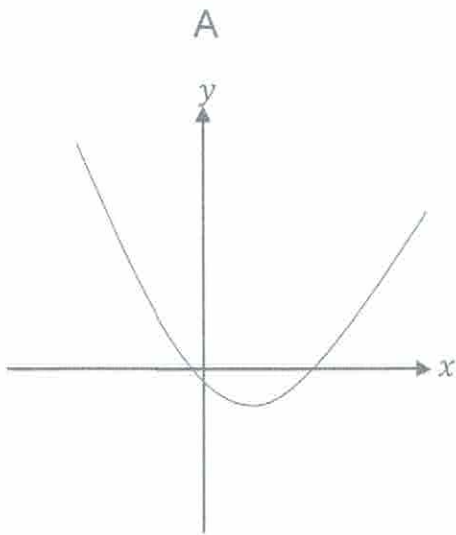$4 \times 5 = 20$

$10^6 \times 10^{-3} = 10^3$

20×10^3 ✓

Answer $2.0 \times 10^{\cancel{3}4}$ ✓

or 2×10^4

22 Circle the sketch of a cubic graph.

[1 mark]

A

B

C

D

23

← 180 − 125 = 55°

125°
180
x
95°

Cyclic quad
opp angles total 180°
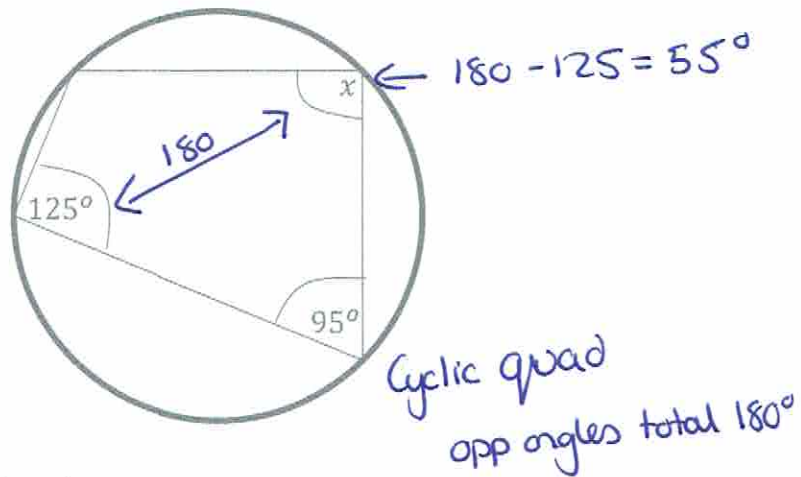
23 (a) Circle the size of angle x.

[1 mark]

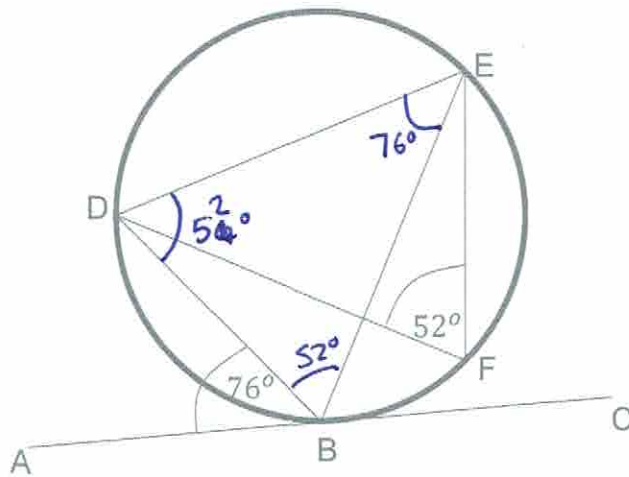125°   (55°)   85°   65°

23 (b) Angle $ABD = 76°$ and angle $DFE = 52°$.

The line ABC is a tangent to the circle at point B.

Calculate the size of angle BDE. You must give reasons for your answer.

[4 marks]

✓ Reasons

Angle DEB = 76° ✓ Alternate segment theorem
Angle DBE = 52° ✓ Angles subtended from the same chord are equal. 2
BDE = 180° − (52+76) = 180 − 128 = 52° Angles in triangle.

Answer _____ 52° ✓

24 Use the quadratic formula to solve

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

[3 marks]

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \qquad a = 2 \quad b = 11 \quad c = 6$$

$$\frac{-(11) \pm \sqrt{(11)^2 - 4(2)(6)}}{2(2)} \quad \checkmark$$

$$x = \frac{-11 + \sqrt{73}}{4} = -0.614 \qquad x = \frac{-11 - \sqrt{73}}{4} = -4.886$$

Answers $\underline{x = -0.614}$ $\checkmark$ $\qquad \underline{x = -4.886}$ $\checkmark$

25 In a bag

    the number of red and blue counters are in the ratio 3:2

    the number of blue and pink counters are in the ratio 7: 5

The total number of red, blue and pink counters in the bag is 585.

How many blue counters are in the bag?

[3 marks]

$$R : B : P$$

$(×7)$ $\quad 3 : 2$

$$7 : 5 \quad (×2)$$

$$21 : 14 : 10 \quad \checkmark$$

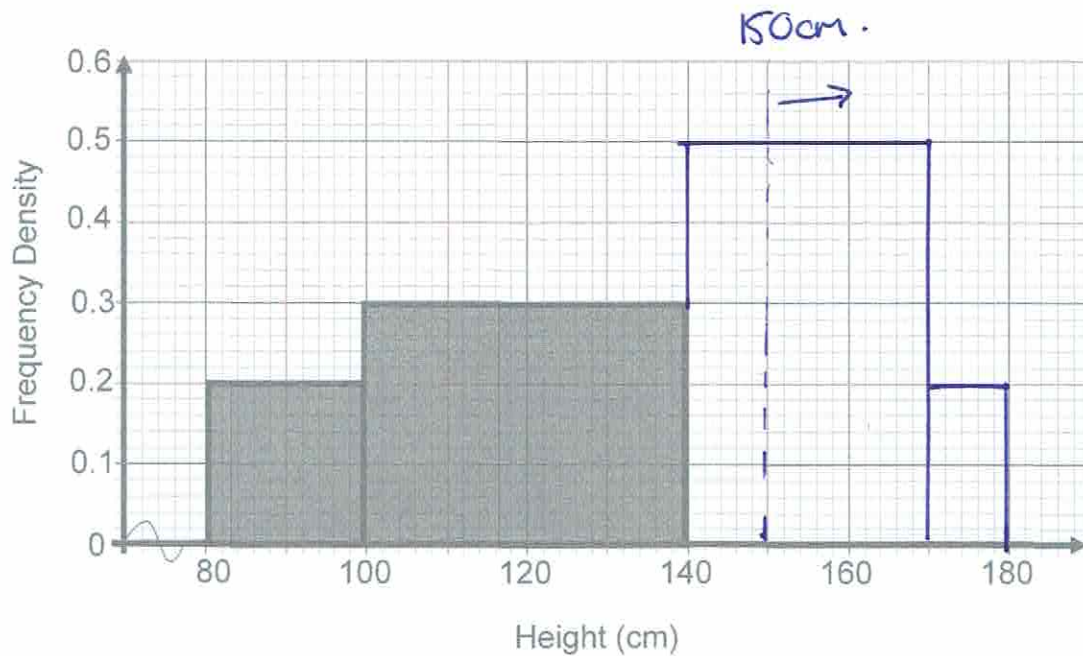$$21 + 14 + 10 = 45 \quad \checkmark$$

$$585 \div 45 = 13$$

$$13 × 14 = 182$$

Answers $\underline{\qquad 182 \checkmark \qquad}$

26 The incomplete table and histogram give some information about the height of students in a year 11 class.

150cm.

26 (a) Use the information in the histogram to complete the frequency table below.

[1 mark]

CW	Height (h, cm)	Frequency	F.d
20	$80 < h \leq 100$	$0.2 \times 20 = 4$	0.2
40	$100 < h \leq 140$	$0.3 \times 40 = 12$	0.3
30	$140 < h \leq 170$	15	$15 \div 30 = 0.5$
10	$170 < h \leq 180$	2	$2 \div 10 = 0.2$
		33	

26 (b) Complete the histogram

[1 mark]

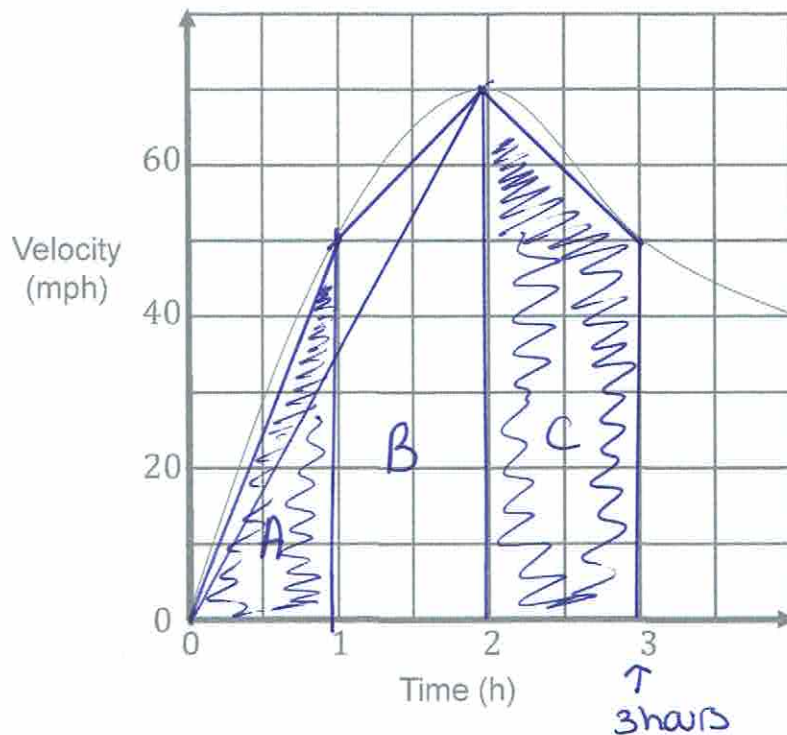**26 (c)** Calculate the proportion of people who are taller than 150cm ~~160~~.

[1 mark]

$(20 \times 0.5) + 2$

$10 + 2 = 12$ people

Answers $12/33$

27   Here is a velocity-time graph for a coach journey.

27 (a) Work out an estimate for the total distance travelled in the first 3 hours.

[3 marks]

Area A = $\frac{1 \times 50}{2}$ = 25 miles ✓ ✓

Area B = $\frac{1}{2} \times \frac{50+70}{2} \times 1$ = 60 miles .

Area C = $\frac{70+50}{2} \times 1$ = 60 miles

Answer _____ 145 miles ✓

27 (b) Is your answer to (a) an underestimate or an overestimate of the actual distance?

Give a reason for your answer.

[1 mark]

[✓] Underestimate   [ ] Overestimate

As each of the shapes used to estimate are underneath the curve.

28 Show that

$$\frac{3x+6}{x^2-9} \times \frac{x^2-4x+3}{x^2+x-2}$$

Simplifies to $\frac{a}{bx+c}$ where a, b and c are integers.

[4 marks]

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

$$= \frac{3}{x+3} \checkmark$$

$a = \cancel{\$}3 \quad b = 1 \quad c = 3$

29 Solve the inequality $x^2 < 2(x+4)$

[4 marks]

$$x^2 < 2x + 8 \checkmark$$

$$x^2 - 2x - 8 < 0$$

$$\checkmark (x-4)(x+2) < 0$$

$$x = 4 \quad x = -2 \quad \searrow y < 0$$

$y = 0$
↓ less than

Answer ___ $\cancel{\&}$ $-4 < x < 2$ $\checkmark$ ___

End of Questions