

Paper 2 June 2017

1) $\frac{39}{800} = 0.04875$
 ≈ 0.049 ✓

2) $36 \text{ mm}^2 \times \frac{1 \text{ cm}}{10 \text{ mm}} \times \frac{1 \text{ cm}}{10 \text{ mm}}$
 $= 0.36 \text{ cm}^2$ ✓

3) A (2, 12) B (8, 2)
 Midpoint is (5, 7)

4) $\begin{matrix} 0 & 1 & 2 & 3 & 4 & 5 \\ 98 & 90 & 82 & 74 & 66 & 58 \\ \swarrow & \searrow & \swarrow & \searrow & \swarrow & \searrow \\ +8 & -8 & +8 & -8 & +8 & -8 \end{matrix}$

$n^{\text{th}} \text{ term} = 98 - 8n$ ✓

this is what you get for free $\nearrow$ this is jumping number $\nwarrow$

5) Amy knows last digit odd but not 7
 choices are 1 3 5 9
 $P(\text{correct choice}) = \frac{1}{4}$ ✓

6) ① ② ③ ④
 (3) $10 \times 10 \times 5$
 $= 500 \text{ possibilities}$ ✓

6a) $\begin{matrix} x & -2 & -1 & 0 & 1 & 2 & 3 \\ y & 4 & 0 & -2 & -2 & 0 & 4 \end{matrix}$

and we draw graph.

the x-coordinate of turning point is $\frac{1}{2}$

In fact $x^2 - x - 2 = (x - \frac{1}{2})^2 - \frac{1}{4} - 2$
 $= (x - \frac{1}{2})^2 - 2\frac{1}{4}$

so the turning point is $(\frac{1}{2}, -2\frac{1}{4})$ ✓

7) $\sin 72^\circ = \frac{x}{8}$
 $x = 8 \sin 72^\circ$
 $= 7.61 \text{ cm.}$ ✓

8) Draw graph

Average speed can be read off the graph assuming we've drawn correctly.
 so 35 mph. ✓

9)

Rock	Pop	Jazz
2	x	2x+5

$P(\text{rock}) = \frac{1}{20}$

and $\frac{2}{2+x+2x+5} = \frac{1}{20}$

so $3x+7 = 40$
 $x = 11$ ✓

so Jazz no. = $11 \times 2 + 5$
 $P(\text{Jazz}) = \frac{27}{40}$ ✓

This question requires a touch more thought than average so worth 4 marks.

10) Men : Women
 110 : 250
 $(250 - 110)n = 3360$
 $n = \frac{3360}{140}$
 $= 24$

so we redraw

Men : Women
 $\begin{matrix} 110 & : & 250 & 360 \\ 2640 & : & 6000 & 8640 \end{matrix}$
 difference = 3360

so all balanced.

Total No. Votes = 8640 ✓

In descending order

$9.56 \times 10^0 = 9.56508...$
 9563

$9.56 \times 10^3 = 9560$ ✓

11)

- 12) Wow! What a lot of lines
Look carefully at $\triangle ABC$
 $\angle ACD = 180 - 80 - 10$
 $= 90^\circ$
therefore AD is the diameter.
but only worth 1 mark.

- 13) bread cheese
 $\begin{matrix} \times 2 & \swarrow 15 & 20 & \searrow \times 3 \\ & 30 & 60 & \end{matrix}$
 but not enough sandwiches
 $\times 4 \quad 120 \quad 240$

$$\text{so cost is } \frac{120}{15} \times 1.88 + \frac{240}{20} \times 2.15$$

$$= £40.84$$

14) so $\frac{\Delta C}{\Delta n} = \frac{5.50 - 2.50}{5}$
 $= 0.6$

so $C = 0.6n + 2.50$

which is an excellent example.
It costs £2.50 before the taxi
even sets off and then 60p/mile

- 15) oh dear. Sam made an
error in the 2nd line.
 $(2y)^2 = 4y^2$

By inspection she could have
avoided all this. It's a

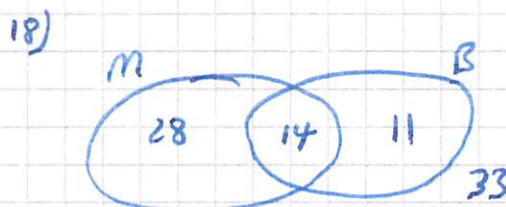
3:4:5 triangle
6:8:10 so $y=5$

Mel is also incorrect
 $y=5$ so the side is 10.

- 16) Median is 28
Now that wasn't too difficult.

17) Length Q = 50×1.2
 Area Q = $0.9(50 \times 1.2)$
 so $50x \times 0.9 = 60y$
 $45x = 60y$

$x:y$
 $60:45$ we swap
 $4:3$ over.



$\frac{1}{3}$ 42 male have blue eyes 14
 $\frac{1}{4}$ 44 female have blue eyes 11
 with a bit of judicious thinking
 we complete the Venn diagram.
 but where are the females?
 they are the two areas outside
 the males.



just a bit tricky,

$P(\text{male/blue}) = \frac{14}{25}$

without a Venn diagram this is quite
a tricky question. It borders on
what is called Bayes Theorem.

19) small : medium : large
 $\begin{matrix} 7 & : & 6 & : & 11 \\ \text{profit } x & : & 2x & : & 3x \end{matrix} \times 8$
 $56 : 48 : 88 = 192$
 total profit = $56x + 48x + 88x$
 $= 192x$
 $x = £1.28$

that this comes out exact gives
a certain assurance we're correct.

$$20) \frac{\sin x}{6} = \frac{\sin 125}{14}$$

$$\text{so } x = \frac{\sin^{-1} 6 \sin 125}{14}$$

$$= 20.6^\circ \quad 14$$

a completely straight forward question with an assured 3 marks

$$21) 5x^2 = 10x + 4$$

As the question says give the answer to 2 dec. places don't waste time trying to factorise.

$$5x^2 - 10x = 4$$

now this looks like completing the square might be safer than using the formula

$$x^2 - 2x = \frac{4}{5} \text{ has same roots.}$$

$$(x-1)^2 = \frac{4}{5} + 1$$

$$(x-1)^2 = \frac{9}{5}$$

$$x-1 = \pm \sqrt{\frac{9}{5}}$$

$$= \pm \frac{3}{\sqrt{5}} + 1$$

$$x = \frac{3}{\sqrt{5}} + 1 = 2.34$$

$$\text{or } -\frac{3}{\sqrt{5}} + 1 = -0.34$$

22)

$$d \propto t^2$$

$$d = kt^2$$

$$45 = k3^2$$

$$k = 5$$

$$d = 5t^2$$

$$\text{if } t = 10 \quad d = 5 \times 10^2$$

$$= 500$$

$$\text{so additional distance}$$

$$= 500 - 45$$

$$= 455 \text{ m.}$$

just a slight catch at the end.
Don't just substitute $t = 7$
and expect the right answer.
That's why this question has
4 marks instead of 3.

$$23) \overrightarrow{BC} = 5a - 2b - 3a - b$$

$$= 2a - 3b$$

$$\overrightarrow{CD} = 3a + b + 3a - 9b$$

$$= 6a - 8b$$

$$= 3(2a - \frac{8}{3}b)$$

Now that second term in $\overrightarrow{CD}$
does not equate to second term
in $\overrightarrow{BC}$. So BCD is not
a straight line.

24)

$$\text{students in block ①} = 5 \times 1.6 = 8$$

$$\text{students in block ②} = 10 \times 0.8 = 8$$

$$\text{students in block ③} = 10 \times 1.2 = 12$$

$$\text{students in block ④} = 20 \times 1 = 20$$

$$\text{which adds up to } 48$$

Now for the interquartile range
we need to find the lower
quarter area and upper quarter area.

$$\text{so where does line draw so area} = 12$$

$$\text{block 8} + 0.8t = 12$$

$$= 5$$

so lower quartile is at 10 min.

where do we draw different t
for last 12 students
obviously 12 minutes back.

$$\text{so upper quartile is at } 45 + 12$$

$$= 33 \text{ min.}$$

$$\text{so IQR} = 33 - 10 = 23 \text{ min.}$$

Now this is fairly tricky and needs
careful thought. Since 2017-2022
AQA have never repeated a question
exactly like this one. It even fooled me.

However if you can get this right
you really do understand
histograms

- 25) Note here that congruency included a mirror image.

Area ABE

$$= \frac{1}{2} 26 \times 15 \times \sin 38^\circ$$

$$\text{so two wings} = 26 \times 15 \times \sin 38^\circ$$

Next we use cosine rule in triangle ABE to find radius.

$$r^2 = 26^2 + 15^2 - 2 \times 26 \times 15 \times \cos 38^\circ$$

which if we work through carefully gives

$$r^2 = 286 \quad (\text{leave as } r^2)$$

$$\text{Area } ABC = \frac{108}{360} \times \pi \times 286$$

$$\text{so total area} = 509.6 \text{ cm}^2 \\ = 510 \text{ cm}^2 \text{ (2sf.)}$$

If we know how to use these two formulae there's nothing intrinsically difficult about this.

- 26 a) The vertex that is invariant is B because that's the centre of the enlargement.

- b) The vertex that is invariant is P because it lies on the line $y = x$.

27 if $h(x) = \sqrt[3]{x}$
 $y = h^{-1}(x)$

$$\text{means } y = x^3$$

so we're just being asked to sketch $y = x^3$.

Remember this is an odd function so has rotational symmetry.

b) $f(x) = \sin x$
 $g(x) = x + 90$

$$\text{so } fg(x) = \sin(x + 90)$$

which is a sine curve shifted back 90° .

it's a cosine curve
check out on your graphical calculator.

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THIS PAPER HAS BEEN CHECKED
CORRECT.