"BETWEEN PAPERS" PRACTICE

SET 1 OF 1 - HIGHER TIER ONLY

SUMMER 2018

EXAMINERS REPORT & MARKSCHEME

NOT A "BEST" GUESS PAPER.

NEITHER IS IT A "PREDICTION" ... ONLY THE EXAMINERS KNOW WHAT IS GOING TO COME UP! FACT! YOU ALSO NEED TO REMEMBER THAT JUST BECAUSE A TOPIC CAME UP ON PAPER 1 OR PAPER 2 IT MAY STILL COME UP ON PAPER 3 ...

WE KNOW HOW IMPORTANT IT IS TO PRACTICE, PRACTICE, PRACTICE .... SO WE'VE COLLATED A LOAD OF QUESTIONS THAT WEREN'T EXAMINED IN THE OCR 9-1 GCSE MATHS PAPER 1 OR PAPER 2 BUT WE CANNOT GUARANTEE HOW A TOPIC WILL BE EXAMINED IN THE NEXT PAPERS ...

ENJOY!
MEL & SEAGER

Question			Answer/Indicative content	Marks	Part marks and guidance	
1			−0.21 and −4.8	3	**B3** only after using quadratic formula Or **B2** for one value correct or for −0.20871.. and −4.7912.. rot Or M1 $\frac{-5 \pm \sqrt{(5^2 - 4 \times 1 \times 1)}}{2 \times 1}$ or for $(x + 2.5)^2 - 6.25 + 1$ oe **Examiner's Comments** The quadratic formula was well known and could be used successfully. However, few scored full marks as they were unable to give their answers to the required level of accuracy. Most often, both answers were given to either one or two decimal places. Common errors that did arise included having *x* in the formula or writing the value of a as zero. Less aware candidates tried to factorise the expression and others tried to 'complete the square', with little success.	**B2** or **M1** available after using complete the square
			Total	**3**		
2	a		$\frac{1}{2} \times 12 \times k + (30 - 12) \times k = 6k + 18k = 24k$	3	**M1** for $\frac{1}{2} \times 12 \times k$ AND **M1** for $(30 - 12) \times k$ Or **M2** for $\frac{1}{2} \times k \times (18 + 30)$	Condone missing × signs
	b		17.1	3	**M2** for $[k =] \frac{410}{24}$ **oe soi** by 17.0[83...] Or **M1** for $24k = 410$	
	c	i	0.272	3	**M2** for $\frac{410 - 13 \times 25}{\frac{1}{2} \times 25^2}$ **oe** Or **M1** for $410 = 13 \times 25 + \frac{1}{2} \times a \times 25^2$	May be done in stages Substitutes numbers correctly into formula (or *their* attempt at a rearranged formula)
		ii	21 **nfww**	5	**M1** for $410 = 15t + \frac{1}{2} \times 0.4t^2$ **oe** AND	**oe** includes $410 = 15t + 0.2t^2$ or $2050 = 75t + t^2$ **M2** or **M1** are

					M2 for [t =] $\dfrac{-15 \pm \sqrt{15^2 - 4 \times 0.2 \times -410}}{2 \times 0.2}$ Or **M1** for [t =] $\dfrac{-15 \pm \sqrt{15^2 - 4 \times 0.2 \times -410}}{2 \times 0.2}$ with at most 1 sign error AND **A1** for [−96.2 to −96.3 or −96 and] 21.2 to 21.3 If no relevant working shown, **SC3** for −96 **and** 21 as final answer Or **SC2** for −96.2 to −96.3 **and** 21.2 to 21.3 as final answer	**FT** from *their* 3 term quadratic Condone 'short' division line in working if seen correct at least once Would earn **M1** only if only "+" or "−" used instead of "±" Maximum **4** marks if unrounded and/or negative solution not rejected
			Total	**14**		
3	a		He should be using 150 not 160 **oe**	1		Accept answer 37.5 as evidence
	b		Tangent at 11am drawn [−]50 to [−]36 Conclusion e.g. estimate is reasonable	B1 B2dep B1dep	No daylight at 11am Dependent on tangent mark awarded Allow integer / integer if in range Or **M1** for rise / run also dependent on tangent drawn or close attempt at tangent. Must see correct or implied calculation from a drawn tangent Dependent on at least B2 earned	Look at the value first and check one unit horizontally for their tangent. Absolute value of gradient must be within 4 of your value. If no value then check working – must be correct Accept estimate is unreasonable depending on *their* gradient and dependent on **B2** earned
			Total	**5**		
4	a		$(x + 5)^2 + 4$	3	**M2** for *their* 4 correctly FT from *their* '$(x + 5)^2$' Or **M1** for $(x + 5)^2$	
	b		(−5, 4)	1FT		FT *their* $(x + a)^2 + b$
			Total	**4**		
5			−2	4	**M1** for $2y = x + 4$ drawn **M1** for $x + y = 5$ drawn **M1FT** for correct region/points identified on graph	

			Total	**4**		
6			bisector of angle A (± 2°) two pairs of correct supporting arcs arc of circle, centre C, radius 4 cm (±2 mm) *their region* indicated	1 1 1 1FT	must be ruled, condone dotted intersection arcs on AB and AD could be short lines or a single arc not freehand, condone dotted and arc must meet their bisector and the line BC, if no bisector where it should have been **FT dep** on any ruled line through A and an arc, centre C, intersecting with their line and BC **Examiner's Comments** This question was poorly done, many did not draw a circle centred on C, several of those who did failed to draw the arc long enough, fewer understood that the constraint "nearer to AB than AD" meant they had to bisect the angle at A, several candidates did not attempt this question although some drew a random shed inside the shape.	on or within the two lines on the overlay meets bisector 'near A' and use the ruler to check tolerance whole region must be within park for 4 marks the bisector through A has to intersect BC
			Total	**4**		
7			* Answer of 161.99 to 162.24 with correct and clear method shown. Appropriate language throughout. Correct answer and method shown but with less structure to solution and slips in notation Any attempt at Pythagoras in 3D **Or** correct use of Pythagoras in 2D **and** considers total surface area Any attempt at Pythagoras in 2D **or** attempt to find total surface area	6 5-4 3-2 1-0	$x^2 + x^2 + x^2 = 9^2$ $3x^2 = 81$ $x^2 = 27$ $(x = \sqrt{27})$ $SA = 6x^2 = 162$ *(Allow 161.99 to 162.24)* Attempt to use 3D Pythagoras (could be using 2D twice) **and** attempt to find total surface area Any attempt at Pythagoras in 3D **Or** any attempt at Pythagoras in 2D **and** considers total surface area No relevant comment **Examiner's Comments** This was the QWC question for this paper. This requires candidates to present their work in a logical, coherent fashion and a small number were able to. Disappointingly, there were those who correctly found the length of a side of the cube but then found its volume instead of	For Pythagoras: – *a*, *b* and *c* must be a number or a letter (one of which may be *a*, *b* or *c*) - allow cosine rule with angle 90 For **3** or more marks Pythag. must contain *x* For **2** or **1** marks Pythag. may be using values or letters and a value

					the surface area. Of the rest, most realised they needed to use Pythagoras' theorem but many got confused if they followed a 2-D method rather than a 3-D method. A trial and improvement method was seen on a number of occasions, often leading to a correct answer. It was common to see candidates assuming that AB was the diagonal of a square. Though an incorrect start, many went on to find a value for the length of the side of the cube and then the total surface area. Weaker candidates struggled to present correctly any correct form of Pythagoras' theorem.	
			Total	**6**		
8			$x^2 + \left(\frac{1}{2}x + 10\right)^2 = 80$	M1		Allow other complete correct methods
			$\frac{1}{4}x^2 + 10x + 100$	B1	Expands bracket correctly	
			$5x^2 + 40x + 80$ [= 0] **oe**	A1		
			$[5](x + 4)^2 = [0]$	M1	FT *their* quadratic	Allow other correct methods e.g. complete the square, use of formula
			Repeated **oe** equal roots hence tangent **oe**	A2	**A1** for $x = -4$ [twice]	
			Total	**6**		
9	a	i	4***a***	1		
		ii	4***b*** – 4***a***	1	allow any equivalent simplified expression	
		iii	3***a***	2	**M1** for – ***b*** + 4***a*** + ¼(4***b*** – 4***a***) or EA + AB + BF or 3b – ¾ (4b –4a) **oe**	Note: EA (etc) does not need arrows
	b		parallel	1	accept AB is 1– times longer **Examiner's Comments** Vectors is clearly one topic which many candidates did not study as can be seen by the number who did not attempt this question in its entirety. These parts are all linked by the same theory so it was usual to see some candidates answer it all correctly whilst others answer it all wrongly. Part (a)(i) did offer the opportunity for some to get at least 1 mark, although some wrote 3*a*. In (a)(ii) the	see accepted list and choose the best if more than one comment **Exemplar Response** parallel (1) AB is 1⅓ times longer (1) They are parallel and multiples of

					most common incorrect answer was $4a + 4b$. Part (a)(iii) was only correctly answered by a few and yet in (b) there were more correct answers presumably by interpreting the diagram.	each other (1) EF is ¾ of AB (1) They are multiples of each other (0)
			Total	**5**		
10			Incorrect as 74 < 80	2	**M1** for $5^2 + 7^2$	
			Total	**2**		
11			38 **nfww**	3	**B1** for figs 195 used **M1** for mass of large bag ÷ mass of small bag **M1** for answer to *their* division seen rounded down **max 2 marks if answer incorrect or 38 from incorrect values** **Examiner's Comments** Most candidates gained some credit, often for showing a division of a value appropriate for the mass of the sack by a value appropriate for the mass of a small bag using consistent units. Some candidates then went on to gain a second method mark for rounding down the result of their division. Only a minority of candidates identified that the minimum number would be found by dividing the lower bound of the mass of the sack by the upper bound of the mass of the bag. A number of candidates failed to convert correctly from kilograms to grams with 2000 g being a common incorrect conversion of 20 kg. Some candidates did not appreciate the need for bounds in this question and simply calculated 20000 ÷ 500 = 40.	Division seen using consistent units of value in range 19kg to 21kg by value in range 400g to 600g If answer > 1
			Total	**3**		
12			$\frac{885}{40.5}$ or 21.8… Orientation that accommodates 21 (or 22) boxes identified e.g. $\frac{110}{50}$ and $\frac{90}{30}$ and $\frac{180}{40}$ 2, 3 and 4 or 24	M2 B1 B1	**M1** for $\frac{885\text{to}895}{39.5\text{to}40.5}$	

			21	A1	if **0** scored then allow **B1** for any validorientation correctly interpreted e.g. $\frac{110}{50}$ and $\frac{90}{30}$ and $\frac{180}{40}$ **and** 2, 3 and 3 or 18	
			Total	**5**		
13			$\sqrt{15^2+35^2+10^2}$	M2	**M1** for $15^2 + 35^2 + 10^2$ or 1550 (may be in two steps of 2D Pythagoras)	If in two steps then figures are: 15, 35 pair = 1450 sq rt = 38.0788.. 15, 10 pair = 325 sq rt = 18.0277... 35, 10 pair = 1325 sq rt = 36.4005.. (roots may be rot to 3sf or more) + must combine to earn **M2** or **M1**
			39.3 to 39.4 and no	A1	Ignore additional comments Allow 39 only after $\sqrt{15^2+35^2+10^2}$ or $\sqrt{1550}$ is shown with no premature approximation Allow **B3** for 39.3 to 39.4 nfww and no **Examiner's Comments** Good candidates answered this well, although a few came to the wrong conclusion. Merely attempting 2-D Pythagoras was the usual error. Weak candidates often found the volume.	ie **M0** for just 2D Pythagoras
			Total	**3**		
14	a		Rectangle that is **not** $4n$ by $2n$	1	**Examiner's Comments** Part (a) was quite well done and many had a ruler and pencil. Some went to great pains to draw another **similar** rectangle and lost the mark. Some drew a rotation of the rectangle or of an enlarged version. Very few candidates drew a different shape entirely such as a parallelogram or triangle.	Length is not double width

	b		*Their* width ÷ *their* length correct and ≠ $\frac{2}{4}$ oe Or 4 × *a* = *their* length **and** 2 × *b* = *their* width	2	**M1** for one correct scale factor or ratio between length and width *b* ≠ *a* **If 0 SC1** for Correct reference to "too long" or "too thin" oe or different scale [factor] **Examiner's Comments** In part (b) very few scored a mark. Most simply said, "They are not similar because the first was 4cm by 2cm and mine is….". Others described rotations, area or perimeter. Almost none mentioned scale factors or ratios between sides.	Fractions must be shown to be different by equivalence or reduction (correctly) to decimals Accept length is not double width oe for 2 marks Must compare both e.g. "It is too long for the width"
			Total	**3**		
15		i	full correct argument e.g. $14.7^2 + 11.5^2$ [=] 19.4^2 348.34 ≠ 376.36 use of appropriate symbol (≠) or a statement that these two numbers are not the same	3	**M1** for an appropriate method e.g. $\sqrt{19.4^2 - 11.5^2}$, $\sqrt{19.4^2 - 14.7^2}$, $\sqrt{11.5^2 + 14.7^2}$ **oe** or cosine rule for angle B **A1** for correct result to compare e.g. 15.6..., 12.6..., 18.6... or 18.7 or B = 94.7 **A1** for a statement that the result does not equal the actual figure **Examiner's Comments** In (i) it was intended that Pythagoras' theorem should be used, however in using trigonometry the question was made more difficult. There were some good calculations, but they need to show either AC has to be shorter or that angle B is not 90°. Other approaches rarely resulted in success.	accept any correct method including a drawing tolerance ±2 mm, **M1** for a triangle with one side correct **A1** for all three sides correct **A1** for measuring *their* angle accurately (±2°) or stating clearly it is not 90° e.g. another equivalent method would be $11.5^2 + 14.7^2 = 18.6...^2$ for **M1 A1** allow these results rounded
		ii	36.2 to 36.22 or 36	3	**M2** for (cos *a*) = $\frac{19.4^2 + 14.7^2 - 11.5^2}{2 \times 19.4 \times 14.7}$ or 0.8068(...)	Make sure that 36 does not come from a wrong method

					or **M1** for $11.5^2 = 19.4^2 + 14.7^2 - 2 \times 19.4 \times 14.7 \times \cos$ *(their a)* **Examiner's Comments** In (ii) the only method was the cosine rule, but many used incorrect results from part (i) with the sine rule. Some tried to use trigonometry, applicable only to right-angled triangles and they should know that these methods are not valid for this type of triangle.	
			Total	**6**		
16			States ∠AOB = ∠DOC and AO = DO and BO = CO	B1	Or two pairs of angles and one pair of sides ∠OAB = ∠ODC , ∠ABO = ∠DCO	Condone AO = CO and BO = DO Allow angles named A, B, C, D but ∠AOB and ∠DOC must be clearly identified
			States a correct reason for a pair of angles and a correct reason for a pair of sides[vertically] opposite [angles] [equal] radii	B1	Or [angles] same segment [equal] or [angles on] same chord/arc [equal] SAS or ASA After B0 award **SC1** for two correct pairs of sides and/or angles with correct reasons seen **Examiner's Comments** Almost all candidates performed very badly on this question, with only a small proportion gaining any marks at all.	Condone 'half diameter' for radius
			Selects correct congruence statement for their argument	B1	A proof requires clear statements giving equal sides and equal angles with correct geometrical reasons concluding with a correct congruence statement. Angles were often paired correctly, but reasons for these were often incorrect or omitted, in particular for the equal angles in the same segment. In some cases sector was used in place of segment, but, more commonly the 'bow tie theorem' was referred to, which is not an acceptable reason. It was often assumed that AB and DC were parallel and 'alternate angles' was used which was not accepted. If the radii were paired up, a reason for this was seldom adequate, with pairs of diameters often	Or AAS

					mentioned rather than radii. Those candidates who had correctly paired angles and sides did not often then go on to give a correct congruence statement. A number of candidates confused congruence with similarity and attempted to prove that the angles in the two triangles were equal with no mention of equal sides.	
			Total	**3**		
17			$\overrightarrow{AD} = \overrightarrow{CE} = 3\mathbf{a}$ $\overrightarrow{AC} = \overrightarrow{DE} = 3\mathbf{b} - a$ Opposite sides equal and parallel hence ACED is a parallelogram	M2 M2 A11 AO2.4a3 AO3.1b1 AO3.3	**M1** for $\overrightarrow{AD} = 3\mathbf{a}$ or $\overrightarrow{CE} = 3\mathbf{a}$ **M1** for $\overrightarrow{AC} = 3\mathbf{b} - \mathbf{a}$ or $\overrightarrow{DE} = 3\mathbf{b} - \mathbf{a}$	
			Total	**5**		