"BETWEEN PAPERS" PRACTICE

SET 1 OF 1 (HIGHER 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 PEARSON/EDEXCEL 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

Q1. There were many successful answers in part (a). But in part (b) students frequently chose the wrong inequality sign, or used an equals sign instead. Those who could see the relationship between the numbers in part (c) just wrote down the correct answer; others merely wrote out the sequence for one of the series, or included all possible numbers from either series.

Q2. This question was well attempted by most candidates but few achieved full marks. Common repeated errors included writing 0.750750… instead of 0.75050…, not multiplying 0.75050… so that the when the two recurring decimals were subtracted a terminating decimal was left or not being able to subtract their, often correct, decimal values. The weaker candidates saw 0.750 and wrote $^3/_4$ as their answer.

Q3. Many students were able to score at least 1 mark in this question, usually in part (i), but few were able to score all 3 marks. A significant number of students attempted to evaluate the calculations by long multiplication/division rather than by relocating the positions of the decimal points in the given information. Students should be advised to estimate the values of calculations as a guide to determining the positions of decimal points in given information.

Q4. Many students who were comfortable working with vectors generally scored at least 3 marks on this question. For the award of the final mark a full and complete proof was required. This question was often left blank many students.

Q5. This question targeted a new area of the specification and it was pleasing to see the majority of students scored at least one mark on this question.

Many students obtained one mark for 215 ÷ 17 = 12.647.. and some went on to correctly indicate that it is not possible to have 0.647.. of a rose tree or that the answer was not an integer when an integer would be required. An alternative method seen was to show 12 × 17 (= 204) and 13 × 17 (= 221) and an explanation that there could not be a number of trees between 12 and 13.

The main errors seen in this question, were to show a correct calculation with no interpretation scoring one mark, or to show 17 × 17 = 289, which has no meaning in this question or to give a vague reason e.g. '215 can't be divided by 17' the latter two do not score any marks.

Q6. In part (a) those students that gained the first mark by substituting two appropriate values into $x^3 + 7x - 5$ often failed to make a deduction about the roots. Students seemed to think that getting one positive answer and one negative answer was sufficient. Many students had no idea how to show that the equation has a solution between $x = 0$ and $x = 1$. Attempts at using the quadratic equation formula were very common.

Many students were able to gain one mark in part (b) by showing a correct first step in the rearrangement, most commonly this was $x^3 + 7x = 5$. Many, though, were then unable to continue with the rearrangement by using factorisation and show a complete method.

When answers were seen in part (c) it was evident that some students had a good appreciation of the process of iteration and they were able to gain the first method mark for substituting the starting value of 1 into the formula. When the results of the next two iterations were not accurate the second method mark could only be awarded if the substitutions were shown. Rounding or truncating the value of x^2 resulted in some final answers that were not sufficiently accurate. Some students carried out more than three iterations. In these responses the accuracy mark was awarded for the value 0.6704 and any further iterations were ignored.

Part (d) was poorly answered. Those students who did gain one mark for substituting their answer to part (c) into $x^3 + 7x - 5$ rarely compared the result of the substitution with zero to determine the accuracy of their estimate. Even when the correct value was substituted the result of the substitution was often incorrect.

Q7. Part (a) was usually well answered by those who understand vector notation. The most common error was leaving expression incomplete or ambiguous by not resolving multiple signs, for example –**a**+ -**b**.

In part (b) many candidates gave the correct response of **a**-**b**. Marks for the explanation were harder to come by. References to parallel lines were needed; evidence of vector notation, for example showing expressions were multiples of each other, provided good evidence of understanding.

Q8. Many values were given correctly in part (a). The most common error was in giving and answer of 3 or -3 for x=-1. Plotting points was quite well done in part (b); nearly all candidates realised that a curve was needed to join the points. Not all candidates knew how to answer part (c). Common errors included reading from the line y=1 or giving the solutions as coordinates rather than values. Few candidates marked the intersection with their curve to show where they were attempting to read off the values. Reading accurately was spoilt sometimes by poorly drawn curves.

Q9. Most students scored some marks on this question. The award of two marks was relatively frequent and shows that these students could correctly identify two of the lines bordering the region. Too often $x = -2$ was seen instead of $y = -2$.

Sometimes $y = x$ and $y = -2$ were given and not $y = 0.5x + 1$. Many students could not give the inequality signs correctly.

For those that failed to score at all, the most common incorrect answer seen was just a list of coordinates with a complete failure to engage with the concept of boundary lines.

Centres are advised to teach students to both plot and state equations of lines.

Q10. The vast majority of students could make no progress with this question designed to test top grade students. Some students confused the geometric sequence with an arithmetic sequence and involved addition of the terms (rather than multiplication).

For part (b) there were again few attempts worth any credit with some students starting their working by using their calculator to write down the value of $7 + 5\sqrt{2}$ as a decimal.

The best students gave clear, concise and full solutions to this question.

Q11. Part (a)(i) was well attempted by most candidates of whom many achieved B1, however, reading the scale incorrectly or not realising there were 19 items of data often led to a nearly correct but B0 answer.

Part (a)(ii) was also well attempted and candidates scored the full range of marks. Many realised they needed to draw lines at 5 (4.75) and 15 (14.25), went on to get 26 and gained full marks, however, candidates frequently used incorrect method. Some were using (19 – 1)÷4 to get the position of their quartiles and read at 13.5, others were reading values above 5 and 15 or using the median as one of their values. The weaker candidates gave answers of 10 (15 – 5), 9.5 (14.25 – 4.75) or 50 (75 – 25).

Again part (b) was well attempted and candidates scored the full range of marks.

Even candidates who failed to gain full marks in part (a)(ii) were able to calculate Mr Wilson's IQR as 36 and correctly compare it to their answer to (a)(ii) for full marks.

Candidates who failed to score any marks usually incorrectly read the scale so neither 64 – 28 nor 36 were seen for B1. Candidates who scored B1 usually also scored C1 though some over complicated the question and tried unsuccessfully to interpret their values which had they stated first which IQR was bigger could still have gained the mark. Weaker candidates stated that Mr Wilson's marks were higher so did not compare the IQRs, compared the quartiles individually or simply stated the quartiles for Mrs Angus and Mr Wilson.

Mark Scheme

Q1.

5MB3H_01 November 2015				
Question	Working	Answer	Mark	Notes
(a)		$x > -4$	1	B1 cao
(b)		$y \leq 3$	2	M1 for intention to isolate y or for $y = 3$ or $y < 3$ A1 cao
(c)		$-1, 0, 1$	2	M1 for listing $-3, -2, -1, 0, 1$ or $-1, 0, 1, 2, 3$ or for $-2 < ? < 2$ A1 for $-1, 0, 1$

Q2.

	Working	Answer	Mark	Notes
	$x = 0.7505050\ldots$ $10x = 7.505050\ldots$ $1000x = 750.505050\ldots$ $990x = 743$ OR $100x = 75.0505050\ldots$ $99x = 74.3$	$\frac{743}{990}$	3	M1 for $0.75050(50\ldots.)$ or $0.7 + 0.050(5050\ldots.)$ M1 (dep) for two recurring decimals that, when subtracted, leave a terminating decimal A1 for $\frac{743}{990}$

Q3.

PAPER: 1MA0_1H					
Question		Working	Answer	Mark	Notes
	(i)		3484	1	B1 cao
	(ii)		34.84	1	B1 cao
	(iii)		670	1	B1 cao

Q4.

Paper: 5MB3H_01					
Question		Working	Answer	Mark	Notes
			proof	4	B1 for $\overrightarrow{AM} = 0.5\mathbf{b}$ or $\overrightarrow{MC} = 0.5\mathbf{b}$ or $\overrightarrow{BC} = \mathbf{a}$ or $\overrightarrow{CX} = \mathbf{a}$ or $\overrightarrow{BX} = 2\mathbf{a}$ Note: This could be shown on the diagram or in a correct vector expression M1 for a correct relevant vector expression for $\overrightarrow{OM}$ or $\overrightarrow{MX}$ or $\overrightarrow{OX}$ eg $\overrightarrow{OM}=\overrightarrow{OA}+\overrightarrow{AM}$ or $\overrightarrow{OX}=\mathbf{b}+2\mathbf{a}$ A1 for any two from $(\overrightarrow{OM}) = \mathbf{a} + 0.5\mathbf{b}$, $(\overrightarrow{MX}) = \mathbf{a} + 0.5\mathbf{b}$ and $(\overrightarrow{OX}) = \mathbf{b} + 2\mathbf{a}$ B1 for a fully correct proof, eg." $\overrightarrow{OX} = 2\overrightarrow{OM}$ so the vectors are parallel and have a common point O " OR (geometric proof) M1 for <OAM = <MCX or OA = CX and AM = CM A1 for <OAM = <MCX with reason (alternate angles) and OA = CX and AM = CM B1 for ΔOAM ≡ ΔXCM with reason, eg SAS B1 for correct proof, eg <AMO = <CMX with reason (vertically opposite angles)

Q5.

Question	Working	Answer	Mark	Notes
		No (supported)	P1 C1	Process to find number of rose trees e.g. 215 ÷17 (=12.647...) or show number of choices with 12 and 13 eg 17 × 12 = 204 and 17 × 13 = 221 No with interpretation that 12.6.. is not a whole number or a whole number of plants must be bought or number of plants would have to be between 12 and 13 which is not possible

Q6.

Question		Working	Answer	Mark	Notes
15	(a)		Shown	M1 C1	for method to establish at least one root between $x = 0$ and $x = 1$, eg f(0) = – 5 and f(1) = 3 for correct values and a deduction about the roots eg as there is a sign change there must be at least one root between $x = 0$ and $x = 1$ (as f is continuous)
	(b)		Shown	C1 C1	for a correct first step in rearrangement, eg $x(x^2 + 7) – 5 = 0$ or $x^3 + 7x = 5$ for clear and correct steps showing complete rearrangement
	(c)	$x_1 = 0.625$ $x_2 = 0.6765327696$ $x_3 = 0.6704483001$	0.6704(483001)	M1 M1 A1	for substitution of 1 into the formula (to get 0.625) for substitution of "$x_1 = 0.625$" and "$x_2 = 0.6765327696$" to give x_2 and x_3 0.6704(483001)
	(d)		Comment	M1 C1	substitutes answer to (c) into expression (to get – 0.00549...) appropriate comment, eg accurate as answer is close to 0

Q7.

Question		Working	Answer	Mark	Notes
	(a)	i $CA = 2OA$ ii $BA=BO+OA= -\mathbf{b}+\mathbf{a}$ iii $BC=BO+OC= -\mathbf{b}-\mathbf{a}$	$2\mathbf{a}$ $\mathbf{a} - \mathbf{b}$ $-\mathbf{a} - \mathbf{b}$	3	B1 for $2\mathbf{a}$ oe B1 for $\mathbf{a} - \mathbf{b}$ oe B1 for $-\mathbf{a} - \mathbf{b}$ oe
	(b)	i $AX = AO + OX$ $= -\mathbf{a} + 2\mathbf{a} - \mathbf{b} = \mathbf{a} - \mathbf{b}$ ii $AX = BA$ so AX is parallel to BA; A is on both AX and BA, so B, A, X are all on a straight line	$\mathbf{a} - \mathbf{b}$ explanation	3	M1 for $AX = AO + OX$ A1 for $\mathbf{a} - \mathbf{b}$ oe B1 (dep on M1) for explanation eg $BX = BO + OX = -\mathbf{b} + 2\mathbf{a} - \mathbf{b} = 2(\mathbf{a} - \mathbf{b})$

Q8.

Question		Working	Answer	Mark	Notes
	(a)	(–2,7), (–1,1), (0,–1), (1,1), (2,7)	1, –1, 7	2	B2 all 3 correct (B1 for 1 or 2 correct) OR M1 for attempt to plot x^2 M1 for attempt to draw x^2
	(b)		Curve drawn	2	M1 at least 4 points plotted from their table; all points ±1 small square A1 cao for correct curve drawn OR M1 for curve $2x^2$ seen, or parabolic curve drawn through (0,–1)
	(c)		0.6 to 0.8 –0.6 to –0.8	2	A1 cao for correct curve drawn M1 for identification of intersection of their curve with x axis, or one solution stated. A1 for both solutions. Accept solutions as 0.6 to 0.8 or –0.6 to –0.8 OR ft from any drawn curve crossing the x-axis (±½ square)

Q9.

Question	Working	Answer	Mark	Notes
		$y \geq -2, y \geq x$ and $y \leq 0.5x + 1$	M1 M1 M1 A1	$y = -2$ indicated; accept any inequality for "=" $y = x$ oe indicated; accept any inequality for "=" $y = 0.5x + 1$ oe indicated; accept any inequality for "=" $y \geq -2, y \geq x$ and $y \leq 0.5x + 1$

Q10.

Question	Working	Answer	Mark	Notes
(a)		2	M1	for start to express the common ratio algebraically, eg $1/(\sqrt{x}-1)$ or $(\sqrt{x}+1)/1$ or $\sqrt{x}+1=k\times 1$ or $1=k\times(\sqrt{x}-1)$
			M1	for setting up an appropriate equation in x, eg $1/(\sqrt{x}-1)=(\sqrt{x}+1)/1$
			C1	for convincing argument to show $x=2$
(b)		Shown	M1	for expressing the relationship between the common ratio, one of the first three terms of the sequence and the fifth term, eg 5th term = 3rd term × (common ratio)^2
			C1	for a complete explanation to include eg, $(\sqrt{2}+1)(\sqrt{2}+1)^2=7+5\sqrt{2}$

Q11.

Question	Working	Answer	Mark	Notes
(a)(i)	Line drawn at 10, Median = 46	45 - 46	3	B1 answer in range 45 to 46 inclusive
(ii)	Line drawn at 5(or 4.75) LQ = 30 ± 1 Line drawn at 15 (or 14.25) UQ = 56 ± 1 IQR = 56 30	26		M1 for lines drawn to the graph at 5 and 15 or at 4.75 and 14.25, (tolerance ±½ square) or LQ = 30± 1 seen or UQ = 56± 1 seen A1 for answer in range 26 ± 2
(b)*	IQR Wilson = 64 – 28 = 36	comment	2	B1 for Wilson IQR = 64 – 28 or 36 seen C1 (dep on B1) (**ft** from 14aii) for a valid statement that compares the two classes e.g. Mr W's class has greater IQR than Mrs A's class