FACTORS, MULTIPLES & PRIMES

Pearson Edexcel - Tuesday 19 May 2020 - Paper 1 (Non-Calculator) Higher Tier

1.

20	$1+\frac{\sqrt{5}}{5}$	P1	for writing $\sqrt{180}$ as $6\sqrt{5}$	This process mark can be awarded whenever this is seen, which might be later in the process.
		P1	for process to rationalising the denominator eg $\frac{\sqrt{180}-2\sqrt{5}}{5\sqrt{5}-5}\times\frac{5\sqrt{5}+5}{5\sqrt{5}+5}$ **or** $\frac{4\sqrt{5}}{5\sqrt{5}-5}\times\frac{5\sqrt{5}+5}{5\sqrt{5}+5}$ oe	
		P1	(dep on previous P1) for expanding terms eg $\frac{5\sqrt{5}\sqrt{180}+5\sqrt{180}-50-10\sqrt{5}}{125-25}$ **or** $\frac{100+20\sqrt{5}}{100}$ oe	
		A1	for $1+\frac{\sqrt{5}}{5}$	Accept written as $a = 1$, $b = 5$

Pearson Edexcel – Thursday 4 June 2020 - Paper 2 (Calculator) Higher Tier

2.

1	(a)	$2\times2\times3\times7$	M1	for a complete method to find prime factors, could be shown on a factor tree, with no more than one arithmetic error **or** for 2, 2, 3, 7	Condone the use of 1
			A1	for $2 \times 2 \times 3 \times 7$ oe	Accept $2^2 \times 3 \times 7$
	(b)	420	M1	for at least 3 multiples of both 60 and 84 (can include 60 and 84) **or** finds the prime factors of both 84 (may be seen in (a)) and 60, may be seen in factor trees	60, 120, 180, 240, 300, 360, 420 84, 168, 252, 336, 420 $60 = 2 \times 2 \times 3 \times 5$ or $2^2 \times 3 \times 5$ If factor tree in (a) is incorrect ft this factor tree in part3 (b) for M1 only
			A1	420 **or** $2 \times 2 \times 3 \times 5 \times 7$ oe	

Pearson Edexcel – Monday 8 June 2020 - Paper 3 (Calculator) Higher Tier

3.

20	98^{91}	B1	cao	Must be clear and unambiguous

Pearson Edexcel - Tuesday 11 June 2019 - Paper 3 (Calculator) Higher Tier

4.

18	(a)	$6x^3 + 35x^2 + 58x + 21$	M1	for a method to find the product of two linear expressions, 3 correct terms out of 4 terms e.g. $2x^2 + x + 6x + 3$ or $3x^2 + 7x + 9x + 21$ or $6x^2 + 14x + 3x + 7$	Note that, for example, $7x + 3$ is regarded as three terms in the expansion of $(2x + 1)(x + 3)$
			M1	for a complete method to obtain all terms, at least half of which are correct (ft their first product) e.g. $6x^3 + 32x^2 + 42x + 3x^2 + 16x + 21$	First product must be a 3 or 4 term quadratic but need not be simplified or may be simplified incorrectly
			A1	cao	Accept $a = 6$, $b = 35$, $c = 58$, $d = 21$
	(b)	$\frac{2}{5} < x < 1\frac{3}{5}$	M1	for first step of finding the square root of both sides eg $1 - x < \pm\frac{3}{5}$ **OR** for writing in the form $ax^2 + bx + c$ (< 0) eg $x^2 - 2x + \frac{16}{25}$ (< 0) or $25x^2 - 50x + 16$ (< 0)	Condone use of an "=" sign; accept one square root (eg $\frac{3}{5}$) only shown.
			M1	for showing critical values $\frac{2}{5}$ (= 0.4) and $1\frac{3}{5}$ (= 1.6) oe	Critical values can be stated, or shown in an expression (which may have incorrect inequality symbols)
			A1	for $\frac{2}{5} < x < 1\frac{3}{5}$ oe	Could be written as two separate expressions eg $x > \frac{2}{5}$ and $x < 1\frac{3}{5}$ oe

Pearson Edexcel - Tuesday 6 November 2018 - Paper 1 (Non-Calculator) Higher Tier

5.

10	(a)	$\frac{1}{5(x-1)}$	B1	for $\frac{1}{5(x-1)}$ or $\frac{1}{5x-5}$	
	(b)	$2(5 + y)(5 - y)$	M1	for partial factorisation, eg $2(25 - y^2)$ oe or $(10 + 2y)(5 - y)$ oe or $(5 + y)(10 - 2y)$ oe or $-2(y^2 - 25)$ oe	
			A1	for $2(5 + y)(5 - y)$ or $-2(5 + y)(y - 5)$	

Pearson Edexcel - Thursday 24 May 2018 - Paper 1 (Non-Calculator) Higher Tier

6.

15	(a)	$(a - b)(a + b)$	B1	cao	Accept reversed brackets
	(b)	$12(x^2 + 1)$	M1	for using 'a' $= x^2 + 4$ and 'b' $= x^2 - 2$ **OR** multiplying out both brackets, at least one fully correct	Correct 4 terms if not simplified or 3 terms if simplified
			M1	(dep) for a correct expression for ('a' + 'b')('a' – 'b') with no additional brackets, simplified or unsimplified eg $(x^2 + 4 + x^2 - 2)(x^2 + 4 - x^2 + 2)$ **or** $(2x^2 + 2) \times 6$ **OR** ft for a correct expression without brackets, simplified or unsimplified eg $x^4 + 8x^2 + 16 - x^4 + 4x^2 - 4$	
			A1	for $12(x^2 + 1)$ **or** $12x^2 + 12$ oe	

Pearson Edexcel - Thursday 24 May 2018 - Paper 1 (Non-Calculator) Higher Tier

7.

17	$\frac{3x + 1}{2x}$	M1	for $(3x + 1)(x - 3)$ **or** $2x(x - 3)$	Accept $(2x + 0)$ for the first two marks but not for the final answer
		A1	for $(3x + 1)(x - 3)$ **and** $2x(x - 3)$	
		A1	$\frac{3x + 1}{2x}$ oe	

Pearson Edexcel - Thursday 2 November 2017 - Paper 1 (Non-Calculator) Higher Tier

8.

1		2×2×3×3	M1 A1	for complete method to find prime factors; could be shown on a complete factor tree with no more than 1 arithmetic error **or** 2,2,3,3,(1) 2×2×3×3 oe

Pearson Edexcel - Wednesday 8 November 2017 - Paper 3 (Calculator) Higher Tier

9.

13		$(x + 3)^2 - 16$	M1 A1	for $(x + 3)^2$ or $(x^2 + 6x - 7 =) x^2 + 2ax + a^2 + b$ cao

Pearson Edexcel - Thursday 25 May 2017 - Paper 1 (Non-Calculator) Higher Tier

10.

2		2×2×2×7	M1 A1	for complete method to find prime factors; could be shown on a complete factor tree with no more than 1 arithmetic error accept $2^3 \times 7$

Pearson Edexcel - Thursday 25 May 2017 - Paper 1 (Non-Calculator) Higher Tier

11.

10		$x^3+6x^2+11x+6$	M1 M1 A1	for method to find the product of any two linear expressions (3 correct terms) e.g. $x^2+x+2x+2$ or $x^2+2x+3x+6$ or $x^2+x+3x+3$ for method of multiplying out remaining products, half of which are correct (ft their first product) e.g. $x^3+x^2+2x^2+3x^2+2x+3x+6x+6$ cao

Pearson Edexcel - Specimen Papers Set 2 - Paper 1 (Non-Calculator) Higher Tier

12.

1	a		$y(y + 27)$	B1
	b		t^6	B1
	c		w^5	B1

Pearson Edexcel - Sample Paper 3 - (Calculator) Higher Tier

13.

6		15, 20, 24	P1 Process to start to find common multiple eg. prime factor decomposition of 6 and 8 or list of at least 3 multiples of all numbers P1 process to find number of packets for at least colour **or** 120 identified A1

Pearson Edexcel - Thursday 4 June 2015 - Paper 1 (Non-Calculator) Higher Tier

14.

9		40, 80, 120 15, 30, 45, 60, 75, 90, 105, 120 40 = 2 × 2 × 2 × 5 15 = 3 × 5	3 and 8 or any multiple of 3, 8	3	M1 for multiples of both 40 and 15 (at least 2 of each shown but condone errors if intention is clear) or for 40 × 15 M1 (dep on M1) for a complete method to find a common multiple of 40 and 15, eg. 120, 240, 600 condoning one arithmetic error in any lists of multiples shown A1 for 3, 8 or any multiple of 3, 8 OR M1 for factors 2,2,2,5 and factors 3,5 M1 (dep on M1) for a complete method to find a common multiple of 40 and 15 A1 for 3, 8 or any multiple of 3, 8

Pearson Edexcel - Friday 13 June 2014 - Paper 2 (Calculator) Higher Tier

15.

14		12, 24, 36, 48, 60, 72, …. 8, 16, 24, 32, 40, 48, 56, 64, 72,…	25.80	5	M1 for listing at least 3 multiples of each of 12 and 8 or 24 in two lists of multiples or from factor trees M1 (dep) for attempt to find a common multiple of 12 and 8 above 60 (=72) M1 (dep M2) for method to find the number of boxes **and** the number of packs 72 ÷12 (=6) and 72 ÷ 8 (=9) M1 for finding the total cost by multiplying numbers by cost and adding eg "6" × 2.50 + "9" × 1.20 A1 for 25.8(0)

Pearson Edexcel - Tuesday 11 June 2013 - Paper 1 (Non-Calculator) Higher Tier

16.

5		5|525 5|105 3|21 7	3 × 5 × 5 × 7	3	M1 for continual prime factorisation (at least first 2 steps correct) or first two stages of a factor tree correct M1 for fully correct factor tree or list 3, 5, 5, 7 A1 3 × 5 × 5 × 7 or 3 × 5^2 × 7

Pearson Edexcel - Tuesday 11 June 2013 - Paper 1 (Non-Calculator) Higher Tier

17.

9		LCM (80, 50) = 400 Matt 400 ÷ 50 = 8 Dan 400 ÷80 = 5 **OR** 50 = 2 × 5 (× 5) 80 = 2 × 5 (× 2 × 2 × 2)	Matt 8 Dan 5	3	M1 lists multiples of both 80 (seconds) and 50 (seconds) (at least 3 of each but condone errors if intention is clear, can be in minutes and seconds) or use of 400 seconds oe. M1 (dep on M1) for a division of "LCM" by 80 or 50 or counts up "multiples" (implied if one answer is correct or answers reversed) A1 Matt 8 and Dan 5 SC B1 for Matt 7, Dan 4 **OR** M1 for expansion of both 80 and 50 into prime factors. M1 demonstrates that both expansions include 10 oe A1 Matt 8 and Dan 5 SC B1 for Matt 7, Dan 4

Pearson Edexcel - Friday 10 June 2011 - Paper 4 (Calculator) Higher Tier

18.

14	(a)(i)		$4(3n + 1)$	1	B1 cao
	(ii)		$3(n + 4)$	1	B1cao
	(b)		$2n + 1$	1	B1cao

Pearson Edexcel - Monday 7 June 2010 - Paper 3 (Non-Calculator) Higher Tier

19.

15		2) 180 2) 90 3) 45 3) 15 5) 5 1 180 2 90 3 30 3 10 2 5	$2\times2\times3\times3\times5$	3	M1 for attempt at continual prime factorization (at least two correct divisions); could be shown as a factor tree OR sight of at least one of each 2,3,5 as factors of 180 A1 for a fully correct factor tree or 2, 2, 3, 3, 5 which may include 1, but no other numbers A1 for $2\times2\times3\times3\times5$ **or** $2^2\times3^2\times5$ [Note $1\times2\times2\times3\times3\times5$ or 2,2,3,3,5 or 2.2.3.3.5 do **not** get the final A1]

OCR GSCE – Thursday 5 November 2020 – Paper 5 (Non-Calculator) Higher Tier

20.

1			3×5^2 **oe**	**2**	**B1** for only 3 and 5 or **M1** for any correct factor pair of 75	Condone inclusion of 1 for B1 Not 1 and 75

OCR GSCE – Thursday 7 June 2018 – Paper 5 (Non - Calculator) Higher Tier

21.

15			$[13n + 3 +] 6n^2 + 9n - 10n - 15$	**M2**	**M1** for two or three of $6n^2 + 9n - 10n - 15$	For M2 accept $6n^2 + - [1]n - 15$ For M1, accept expansion on grid with negative signs shown
			$6n^2 + 12n - 12$	**A1**		For A1, condone $6n^2 + 12n - 12 = 0$
			$6(n^2 + 2n - 2)$ and is a multiple of 6 **oe**	**A1**	Dep on M2 A1 and no errors seen Accept $(6n^2 + 12n - 12) \div 6 = n^2 + 2n - 2$ and is a multiple of 6 **oe**	Do not accept each term is a multiple of 6 without showing the outcome $n^2 + 2n - 2$

OCR GSCE – Tuesday 6 November 2017 – Paper 5 (Non - Calculator) Higher Tier

22.

3			122 with justification showing 121 or $11^2 + 1$ and 125 or $5^3 - 3$	**4**	**B3** for answer 122 OR **M1** for at least 5 square numbers (or 5 square numbers + 1) **isw** **M1** for at least 3 cube numbers (or 3 cube numbers – 3) **isw** **M1** for reducing their list to non-primes If 0 scored, **SC1** for answer 5 or 17 or 37 or 61 or 101	 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144 2, 5, 10, 17, 26, 37, 50, 65, 82, 101, 122, 145 1, 8, 27, 64, 125 5, 24, 61, 122 Implied by any non-prime answer less than 150

AQA GSCE – Monday 12 November 2018 – Paper 3 (Calculator) Higher Tier

23.

7	Any correct value	M1	11, 23, 37, 53, 71, 91, 113, 137, 163
	Selects 91 as the only incorrect value with no errors in values given	A1	oe eg stops at 91
	91 and 13 (is a factor) or 91 and 7 (is a factor) or 91 and 13 × 7	A1	oe eg 91 ÷ 7 = 13
	Additional Guidance		
	Ignore incorrect evaluations for first mark		
	Ignore all values for n greater than 9		
	Do not allow 11 within a list of prime numbers eg 2, 3, 5, 7, 11…		
	Error in list eg 12, 23, 37, 53, 71, 91, 113, 137, 163 with 12 and 91 selected as not prime (not valid as incorrect)		M1A0A0
	Error in list eg 12, 23, 37, 53, 71, 91, 113, 137, 163 with only 91 selected as not prime (not valid as incorrect conclusion from their list)		M1A0A0
	$9^2 + 9 + 1 = 91$ is incorrect working		M0A0A0

AQA GSCE – Tuesday 12 June 2018 – Paper 3 (Calculator) Higher Tier

24.

17	7 × 5 (× 9) or (100 – 30) ÷ 2 (× 9) or 35 (× 9) or 99 ÷ 11 or 9 or 4 × 5 × 4 × 5	M1	First two digits of Method A Last two digits of Method A Complete for Method B
	315 or 400	A1	
	315 and 400 with Method B identified	A1	Method B can be implied by choosing 400
	Additional Guidance		
	315 and 400 and B with no working		M1A1A1
	315 and 400 with 400 circled		M1A1A1
	Beware 40 × 10 = 400 (for Method A) is incorrect working		

AQA GSCE – Thursday 2 November 2017 – Paper 1 (Non - Calculator) Higher Tier

25.

26(a)	$0.\dot{7} \div 10 = 0.0\dot{7}$ and $\frac{7}{9} \div 10 = \frac{7}{90}$ or $0.0\dot{7} \times 10 = 0.\dot{7}$ and $\frac{7}{90} \times 10 = \frac{7}{9}$ or $0.\dot{7} \div 10 = 0.0\dot{7}$ and $\frac{7}{90} \times 10 = \frac{7}{9}$ or because the decimal is divided by 10 the 9 has to be multiplied by 10	B1	oe
	Additional Guidance		
	Algebraic methods		B0
	Division of 7 by 90		B0

26(b)	**Alternative method 1**		
	$0.2 + 0.0\dot{7}$ or $\frac{2}{10} + \frac{7}{90}$	M1	
	$\frac{18}{90} + \frac{7}{90}$ or $\frac{25}{90}$	M1dep	
	$\frac{5}{18}$	A1	
	Alternative method 2		
	$10x = 2.777...$ or $100x = 27.777...$	M1	Any letter
	$10x - x = 2.777... - 0.277...$ or $9x = 2.5$ or $\frac{2.5}{9}$ or $100x - x = 27.777... - 0.277...$ or $99x = 27.5$ or $\frac{27.5}{99}$ or $100x - 10x = 27.777... - 2.777...$ or $90x = 25$ or $\frac{25}{90}$	M1dep	oe
	$\frac{5}{18}$	A1	

AQA GSCE – Wednesday 8 November 2017 – Paper 3 (Calculator) Higher Tier

26.

26	Full explanation stating one of $a + b$ or $a - b$ must be 1 and $a + b$ cannot be 1 and $a - b$ must be 1	B2	B1 partial explanation ie $a + b$ or $a - b$ must be 1 or $a + b$ cannot be 1 or $a - b$ must be 1
	Additional Guidance		

AQA GSCE – Sample Paper 3 (Calculator) Higher Tier

27.

12(a)	Ticks 'False' and states that x could be -4	B1	oe
12(b)	True and $20n \div 2n = 10$	B1	oe
12(c)	False and y could be between 0 and 1	B1	oe eg False and $y = 0.5$