POWERS AND ROOTS

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

1.

5		27	B1	cao	

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

2.

4		6.25	B1	for 6.25 oe	

Pearson Edexcel - Tuesday 21 May 2019 - Paper 1 (Non-Calculator) Foundation Tier

3.

15	(a)	8	B1	cao	
	(b)	125	B1	cao	

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

4.

4	9, 27	B1	cao	Do not award the mark if other numbers are shown.

Pearson Edexcel - Thursday 8 November 2018 - Paper 2 (Calculator) Foundation Tier

5.

2	odd square	B1	stating an odd square number eg 1, 9, 25, 49, 81, etc.	

6.

4	4	B1	cao	

Pearson Edexcel - Monday 12 November 2018 - Paper 3 (Calculator) Foundation Tier

7.

3	1.2	B1	oe	Accept $\frac{12}{10}$ or $\frac{6}{5}$

Pearson Edexcel - Thursday 7 June 2018 - Paper 2 (Calculator) Foundation Tier

8.

3		243	B1	cao	

Pearson Edexcel - Tuesday 12 June 2018 - Paper 3 (Calculator) Foundation Tier

9.

8	(a)	2.28	B1	cao	
	(b)	2.5604	B2 (B1	cao for 6.6564 seen, or for 2.56 or for digits 25604)	If the correct answer is shown and then rounded, award full marks.

Pearson Edexcel – Specimen 2 - Paper 1 (Non-Calculator) Foundation Tier

10.

3	a		28	B1
	b		1020	B1
	c		−8	B1

Pearson Edexcel – Specimen 2 - Paper 2 (Calculator) Foundation Tier

11.

4		625	B1 cao

Pearson Edexcel – Specimen 2 - Paper 3 (Calculator) Foundation Tier

12.

9	(a)		4.6	B1 cao
	(b)		4.8025	B1 for 2.7 or 2.1025 (implied by answer of 4.8025) B1 cao

Pearson Edexcel – Specimen 1 - Paper 1 (Non-Calculator) Foundation Tier

13.

5		−27	B1 cao

Pearson Edexcel – Specimen 1 - Paper 2 (Calculator) Foundation Tier

14.

15	(a)		168	B1
	(b)		14.85	M1 for 12.25 or 2.6 A1

Pearson Edexcel – Specimen 1 - Paper 3 (Calculator) Foundation Tier

15.

11	(a)		7	B1 cao
	(b)		256	B1 cao

16.

12		Yes with evidence	C1 for writing down at least two squares numbers P1 for adding square numbers A1 cao with supporting evidence

OCR – Tuesday 03 November 2020- Morning - Paper 1 (Calculator) Foundation Tier

17.

10			10 000	**2**	**M1** for 20 × 5	**M1** may be implied by 100

18.

17	**(a)**		93 200	**1**		
	(b)		3.04×10^6	**4**	B3 for 3 040 000 or $3.041[0..] \times 10^6$ or 30.4×10^5 oe rounded to 3sf OR B2 for 3 041 000 or $30.41[0..] \times 10^5$ oe index form OR **M1** for $(3.98 \times 10^6) - (9.39 \times 10^5)$ or 3 980 000 – 939 000 and **M1** for *their final value* correctly rounded to 3sf	**M1** may be implied by figs 3041…. The unrounded value must be seen
	(c)		Wrong/Incorrect it is 3 000 or 2 984 to 2 985 times bigger or No, difference is [order of] 3×10^3 which is 3 000 or Incorrect 11 760 is 3 times bigger than 3 920 or 3 900 000 is 3 times smaller than 11 700 000 or Incorrect and evaluates USA's production ÷ 3 or Japan's production × 3 with comment comparing the values	**2**	**M1** for difference is [order of] 10^3 or $\frac{1.17 \times 10^7}{3.92 \times 10^3}$ or $(1.17 \times 10^7) \div 3 = 3.9 \times 10^6$ or 11 700 000 ÷ 3 = 3 900 000 or $(3.92 \times 10^3) \times 3 = 1.176 \times 10^4$ or 1.18×10^4 or 3 920 × 3 = 11 760	Wrong/Incorrect and a comment for 2 marks to answer the question Condone No Values must be in the same form for comparison.

OCR Thursday 05 November 2020- Morning (Non-Calculator) Foundation Tier

19.

8	**(a)**		3^4	**1**		
8	**(b)**		64 [×] $\frac{1}{4}$ 16 is a square number **oe**	**2** **1dep**	**B1** for each correct value Dep on 2 previous marks earned	Allow B1 for $2^6 \div 4$ or 4 seen as a denominator or 0.25 for $\frac{1}{4}$ Accept $16 = 4 \times 4$ or $16 = 4^2$

OCR November 09 November 2020- Morning (Calculator) Foundation Tier

20.

12	**a**	**i**	6	**1**		
		ii	-5	**1**		
	b		-1	**2**	**B1** for $1 = 2^0$ or **M1** for $2^y = \frac{1}{2}$ or $2^{1+y} = 2^0$ or $1 + y = 0$ or $2 \times 2^{-1} = 1$	**B1** Implied by $2 \times 2^y = 2^0$

OCR Thursday 07 November 2019- Morning (Non-Calculator) Foundation Tier

21.

3	**(a)**		10	**1**		
3	**(b)**		7	**1**		
3	**(c)**		5	**1**		

OCR Monday 11 November 2019 – Afternoon (Calculator) Foundation Tier

22.

12 **(a)** Find the value of

(i) $\sqrt[3]{216}$,

(a)(i) ..... **[1]**

(ii) 2^8.

(ii) ..... **[1]**

(b) The cube of 3 is added to the square root of 7.

Put a ring around the correct statement.

$\sqrt[3]{3}+7^2$ $\quad 3^3+7^2$ $\quad 3^3+\sqrt{7}$ $\quad \sqrt[3]{3}+\sqrt{7}$

[1]

OCR Tuesday 21 May 2019 – Morning (Calculator) Foundation Tier

23.

2	**(a)**	**(i)**	Any odd number	**1**	Accept more than 1 if all correct
		(ii)	1, 5 or 25	**1**	If more than one, all must be correct (condone factor products)
		(iii)	23 or 29	**1**	Accept both
	(b)		Explanation based on $\sqrt{55}$ or 7^2 and 8^2 eg $\sqrt{55}$ is between 7 and 8 or 55 is between 49 and 64 [so it cannot be a square number] $\sqrt{55}$ [= 7.4..] is not a whole number	**2**	**B1** for 7.4… or $7^2 = 49$ or $8^2 = 64$ or 7^2 and 8^2 or 49 and 64 e.g. $\sqrt{55} = 7.4$

24.

14	**(a)**	**(i)**	360 cao	**1**	
		(ii)	356.1 cao	**1**	
	(b)	**(i)**	4	**1**	Do not accept 3^4
		(ii)	8	**1**	Do not accept 6^8

OCR Thursday 6 June 2019 – Morning (Non-Calculator) Foundation Tier

25.

5	(a)	(i)	25	1		
		(ii)	4	1		
	(b)		56	2	**M1** for [2^3 **oe** =] 8 or [$\sqrt{49}$ =] 7	Condone ±56 or -56 For M1 condone ±7 or -7

OCR Tuesday 6 November 2018 – Morning (Calculator) Foundation Tier

26.

4	(a)	(i)	Any even number	1		Accept more than one, if all even
		(ii)	1 or 5 or 25	1		Accept more than one, if all correct Condone 1 × 25 or 5 × 5
		(iii)	11 or 13 or 17 or 19	1		Accept more than one, if all correct
		(iv)	Any cube number	1		Accept more than one, if all correct Do not accept e.g. 2 ×2 × 2 or 2^3
	(b)		7	2	**M1** for 5, 7 and 7, 13	Could be a correct Venn diagram

OCR Thursday 8 November 2018 – Morning (Non-Calculator) Foundation Tier

27.

7	(a)		3	1		
	(b)		49	2	**M1** for 7 × 7 oe	
	(c)		$\frac{1}{6}$	1		

28.

13	(a)		3.16×10^{-3}	1		
	(b)		8×10^7	2	**M1** for 80 000 000 **seen** or $n \times 10^7$	Condone $10^7 \times n$ for M1

OCR Monday 12 November 2018 – Morning (Calculator) Foundation Tier

29.

4			25	2	**M1** for 1 + 4 soi by 5	

30.

13	(a)		16	2	**M1** for 2 × 2× 2 × 2	
	(b)		2	2	**B1** for 25 or 5^2	

OCR Monday 24 May 2018 – Morning (Calculator) Foundation Tier

31.

1	(a)	(i)	5	1		
		(ii)	8	1		
	(b)	(i)	6	1		
		(ii)	10	2	B1 for only 2 and 12 identified	

32.

4			144 final answer	2	M1 for 27 – 15 implied by 12	

OCR Thursday 7 June 2018 – Morning (Non-Calculator) Foundation Tier

33.

3	a	i	1000	2	M1 for 10 × 10 × 10	
		ii	18	2	M1 for 9(8 – 6) or 9 x 2 or SC1 for answer of 90 or -18	M1 for eg 72 – 54
	b		1 + 2 ×(3 + 5)=17	1	Or 1 +(2 ×(3 + 5))=17	Condone 1 + 2 (3 + 5) = 17 if rewritten

OCR Tuesday 12 June 2018– Morning (Calculator) Foundation Tier

34.

2	(a)	(i)	3100	1		
		(ii)	0.03	1		
		(iii)	3	1		Accept +3
	(b)		−6	1		
	(c)		0.06 0.4 0.444 0.46 0.5	2	B1 for four in correct order	Use "cover up" method and accept all to 3 dp, eg 0.460

35.

3	(a)		4	1		
	(b)		42.9 cao	2	B1 for 42.8 or 42.87[5] or 42.88 or 43 seen	

36.

20	(a)		$a^5 \times a^6 = a^{5+6} = a^{11}$ or $a^5 \times a^3 \times a^3 = a^{5+3+3} = a^{11}$	2	B1 for $[(a^3)^2 =] a^6$ or $a^3 \times a^3$ Alternative: B2 for $[a^5 \times (a^3)^2 =]$ $a \times a \times \ldots \times a$ $[= a^{11}]$ or B1 for $[(a^3)^2 =] a \times a \times a \times a \times a \times a$	a^{5+6} or a^{5+3+3} or intent to add indices stated or unambiguously indicated (eg 5 + 6, add indices etc) written in full with eleven a's. written in full with six a's May be implied by ($a \times a \times a \times a \times a \times a$) seen within an incorrect lengthier product.
	(b)		5^{15}	3	B1 for $\left[\frac{1}{125} =\right] 5^{-3}$ or $[125 =] 5^3$ B1 for 5^{18}	

OCR Thursday 2 November 2017– Morning (Calculator) Foundation Tier

37.

3	(a)	(i)	7900	1		
		(ii)	8000	1		
	(b)		7	1		Do not allow 3^7

OCR Monday 6 November 2017– Morning (Calculator) Foundation Tier

38.

7	a	i	3	1		
		ii	22	1		
	b	i	32	1		
		ii	20	1		Accept ± 20
	c		10	3	**M2** for two values from 20, 4 and 8 used correctly in calculation or **M1** for 20 or 4 or 8	eg $\frac{23 \times 4}{8}$ or $(24 \div 8) \times 4$

OCR Monday 6 November 2017– Morning (Calculator) Foundation Tier

39.

17			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

Pearson Edexcel –Sample Papers - Paper 2 (Calculator) Foundation Tier

40.

3		27 or 64	B1 cao

41.

4		7.3225	M1 for 5.5225 **or** 1.8 A1 cao

OCR Wednesday 8 November 2017– Morning (Calculator) Foundation Tier

42.

4	**(a)**	**(i)**	–12	**1**		
		(ii)	256	**1**		
	(b)		10.35 cao	**1**		

OCR Thursday 8 June 2017 – Morning (Non - Calculator) Foundation Tier

43.

8	**a**	**i**	11	**1**		Accept -11, ±11
		ii	$\frac{1}{16}$	**1**		Accept 0.0625
	b		9	**2**	**M1** for $(9-6)^2$ or better **Or** **SC1** for answer of 144	
	c		$5^3 = 125$	**1**		

OCR Sample Question Paper 3 – Morning/Afternoon (Calculator) Foundation Tier

44.

10	**(a)**		56	**1** **1 AO1.3a**		
	(b)		5	**1** **1 AO1.3a**		
	(c)		$\frac{1}{25}$ or 0.04	**1** **1 AO1.3a**		

AQA Thursday 4 June 2020 – Morning (Calculator) Foundation Tier

45.

Q	Answer	Mark	Comments
8(a)	Any even square whole number	B1	eg 4 or 16 or 36 or 64
	Additional Guidance		
	0		B1
	$2^2 = 4$		B1
	Answer only of 2^2		B0
	Answer only of $\frac{16}{4}$		B0

Q	Answer	Mark	Comments
8(b)	125 216 343 with no extras	B2	B1 125 216 343 seen with extras or two of 125 216 343 seen alone or with extras or 5^3 6^3 7^3
	Additional Guidance		
	125 216 343 seen with answer 5^3 6^3 7^3		B2
	5^3 6^3 7^3 only		B1
	125 216 343 seen with answer 5 6 7		B1
	5 6 7 only		B0
	Extras may be incorrect for B1		

Q	Answer	Mark	Comments
8(c)	3 and 72 or 6 and 36 or 9 and 24 or 12 and 18	B1	either order
	Additional Guidance		
	Answer line takes precedence		
	Award the mark for embedded answers only if the answers are selected eg1 216 ÷ 3 = 72 with no answer or with incorrect answer eg2 216 ÷ (3) = (72) with no contradictory answer eg3 3 × 72 in working with no contradictory answer		 B0 B1 B1

AQA Thursday 6 June 2019 – Morning (Calculator) Foundation Tier

46.

1	26	B1	
	Additional Guidance		

AQA Thursday 11 June 2019 – Morning (Calculator) Foundation Tier

47.

20	$(x =)$ 14 and –14	B2	B1 $(x =)$ 14 or $(x =)$ –14
	Additional Guidance		

AQA Tuesday 6 November 2018 – Morning (Non-Calculator) Foundation Tier

48.

29	**Alternative method 1**		
	$(6^2 =) 36$ or $(8^2 =) 64$ or 100 or $\sqrt{100}$	M1	
	10	A1	
	their $10 = 5a$ or $(\text{their } 10)^3 = 125a^3$ or $1000 = 125a^3$ or $8 = a^3$	M1	
	2	A1ft	ft their 10 with both method marks scored
	Alternative method 2		
	5 or a	M1	
	$5a$	A1	
	their $5a = \sqrt{100}$ or their $5a = 10$	M1	$(a =)\frac{\sqrt{100}}{5}$ or $(a =)\frac{10}{5}$ implies M1A1M1
	2	A1ft	ft their $5a$ with both method marks scored
	Additional Guidance		
	Use the scheme that gives the better mark eg1 $\sqrt{14^2} = 5a$, $14 = 5a$, $a = 2.8$ scores M0A0M1A0 on alt 1 and M1A1M0A0 on alt 2 eg2 $\sqrt{100} = 5a^3$, $10 = 5a^3$, $a = \sqrt[3]{2}$ scores M1A1M0A0 on alt 1 and M1A0M1A1ft on alt 2		Award M1A1M0A0 Award M1A0M1A1ft

AQA Monday 12 November 2018 – Morning (Calculator) Foundation Tier

49.

11	729	B1	
	Additional Guidance		

AQA Thursday 7 June 2018 – Morning (Calculator) Foundation Tier

50.

3	5^4	B1	
	Additional Guidance		

AQA Thursday 7 June 2018 – Morning (Calculator) Foundation Tier

51.

5	$(3^6 =)$ 729 seen or $(\sqrt{841} =)$ 29 seen	M1	
	700	A1	
	Additional Guidance		

AQA Thursday 2 November 2017 – Morning (Non-Calculator) Foundation Tier

52.

<table>
<tr><td rowspan="3">20a</td><td>n = an odd number
and p = a prime number
such that $n + p$ is a square number</td><td>B1</td><td>eg
n = 1 and p = 3
n = 9 and p = 7</td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="2">Some of the early correct pairs are :-
<table><tr><th>n</th><th>p</th></tr><tr><td>1</td><td>3</td></tr><tr><td>3</td><td>13</td></tr><tr><td>5</td><td>11</td></tr><tr><td>7</td><td>2 or 29</td></tr><tr><td>9</td><td>7</td></tr><tr><td>11</td><td>5</td></tr><tr><td>13</td><td>3 or 23</td></tr><tr><td>17</td><td>19</td></tr><tr><td>19</td><td>17</td></tr><tr><td>23</td><td>2</td></tr><tr><td>25</td><td>11</td></tr><tr><td>31</td><td>5</td></tr></table></td><td>B1</td></tr>
</table>

<table>
<tr><td rowspan="3">20b</td><td>n = an odd number
and p = a prime number
such that np is a square number</td><td>B1</td><td>eg
n = 3 and p = 3
n = 27 and p = 3</td></tr>
<tr><td colspan="3">Additional Guidance</td></tr>
<tr><td colspan="2">Some of the early correct pairs are :-
<table><tr><th>n</th><th>p</th></tr><tr><td>3</td><td>3</td></tr><tr><td>5</td><td>5</td></tr><tr><td>7</td><td>7</td></tr><tr><td>11</td><td>11</td></tr><tr><td>13</td><td>13</td></tr><tr><td>17</td><td>17</td></tr><tr><td>23</td><td>23</td></tr><tr><td>27</td><td>3</td></tr></table></td><td>B1</td></tr>
</table>

53.

	$((\sqrt{3})^2 =) 3$ and $((\sqrt{2})^2 =) 2$ or $(\sqrt{6})^2$ or $\sqrt{6^2}$ or $\sqrt{36}$ or $\sqrt{9} \times \sqrt{4}$ or $\sqrt{9 \times 4}$	M1	
	6	A1	
	Additional Guidance		
	$3 \times 2 = 6$ with answer eg $\sqrt{6}$ or 6^4		M0A0
29	Condone $\sqrt{3} = 1.7$, $1.7^2 = 3$ and $\sqrt{2} = 1.4$, $1.4^2 = 2$, otherwise $\sqrt{3}$ or $\sqrt{2}$ or 3^2 or 2^2 incorrectly evaluated does not score even if answer is 6		
	eg $\sqrt{3} = 1.5$, $1.5^2 = 3$, answer 6		M0A0
	$\sqrt{2} = 1$, $1^2 = 2$		M0A0
	$3^2 = 6$, $\sqrt{6} = 3$		M0
	$(\sqrt{6})^4$		M0A0
	$\sqrt{2} = 1$		M0

AQA Monday 6 November 2017 – Morning (Calculator) Foundation Tier

54.

2	2	B1	

55.

12	19.5	B1	

AQA Wednesday 8 November 2017 – Morning (Calculator) Foundation Tier

56.

1	1000	B1	

AQA Wednesday 8 November 2017 – Morning (Calculator) Foundation Tier

57.

23	Lists three from 3, 9, 27, 81, 243, 729 or lists three from 1, 4, 9, 16, …, 225, 256, 289 or correctly evaluating a power of 3 + a square number or correctly evaluating 268 – a power of 3 or correctly evaluating 268 – a square number	M1	eg $27 + 25 = 52$ or $3^3 + 5^2 = 52$ eg $268 - 27 = 241$ eg $268 - 49 = 219$
	$243 + 25$ or $3^5 + 5^2$	A1	oe Addition sign must be seen in working or on answer line
	Additional Guidance		
	3^5, 5^2 or 3^5 and 5^2 on answer line		M1A0
	$268 - 243 = 25$		M1A0
	243, 25 or 243 and 25 on answer line		M1A0
	Beware of $5^3 + 5^2$		

AQA Tuesday 13 June 2017 Morning– Morning (Calculator) Foundation Tier

58.

4	32	B1	

AQA Sample Paper 3– Morning (Calculator) Foundation Tier

59.

3	27	B1	

AQA Sample Paper 3– Morning (Calculator) Foundation Tier

60.

18	10 000	B1	