2.16 Number, Ratio and Algebra Depth: 2-hour Pack

ISEB CE 13+ Mathematics · Calculator allowed · about 120 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Work out $(4.7 \times 10^7) \times (7.1 \times 10^5)$. Give your answer in standard form.

- ☐ A) 3.337×10^{14}
- ☐ B) 33.37×10^{12}
- ☐ C) 11.8×10^{12}
- ☐ D) 3.337×10^{13}
- ☐ E) 3.337×10^{35}

---

2 Uma thinks of a number, multiplies it by 9, then adds 2. The answer is 29. What number did Uma think of?

- ☐ A) 3
- ☐ B) -3
- ☐ C) 243
- ☐ D) 2
- ☐ E) 4

---

3 Write $6^9 \times 6^4$ as a single power of 6.

- ☐ A) 6^{14}
- ☐ B) 6^{13}
- ☐ C) 6^{26}
- ☐ D) 6^{12}
- ☐ E) 6^5

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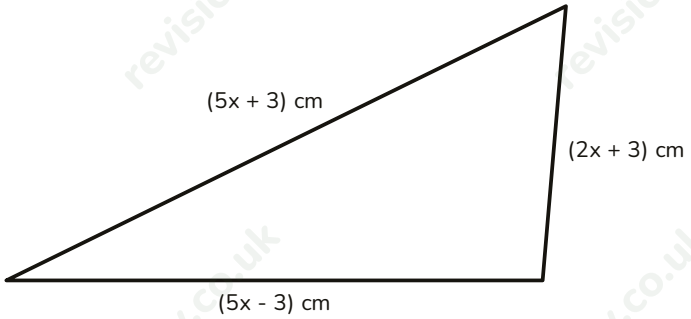
4 Work out $(1.7 \times 10^{-2}) \div (8 \times 10^{4})$. Give your answer in standard form.

- ☐ A) 0.2125×10^{-6}
- ☐ B) 2.125×10^{2}
- ☐ C) 2.125×10^{-7}
- ☐ D) 2.125×10^{7}
- ☐ E) 2.125×10^{-6}

---

5 A triangle has sides of length (5x - 3) cm, (2x + 3) cm and (5x + 3) cm. Its perimeter is 99 cm. What is the value of x?

Diagram NOT accurately drawn



- ☐ A) x = 9
- ☐ B) x = 32
- ☐ C) x = -8
- ☐ D) x = 8.5
- ☐ E) x = 8

---

6 Write $6^{6} \div 6^{3}$ as a single power of 6.

- ☐ A) 6^{2}
- ☐ B) 6^{-3}
- ☐ C) 6^{18}
- ☐ D) 6^{3}
- ☐ E) 6^{4}

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7 Write 4.7×10^3 as an ordinary number.

- [ ] A) 0.0047
- [ ] B) 4,700
- [ ] C) 470,000
- [ ] D) 47,000
- [ ] E) 470

---

8 Callum thinks of a number, multiplies it by 5, then adds 4. The answer is 34. What number did Callum think of?

- [ ] A) 150
- [ ] B) -6
- [ ] C) 6
- [ ] D) 7
- [ ] E) 5

---

9 Write $2^4 \times 2^6$ as a single power of 2.

- [ ] A) 2^{10}
- [ ] B) 2^{24}
- [ ] C) 2^{-2}
- [ ] D) 2^{20}
- [ ] E) 2^9

---

10 Hamza thinks of a number, multiplies it by 9, then adds 9. The answer is 36. What number did Hamza think of?

- [ ] A) -3
- [ ] B) 3
- [ ] C) 243
- [ ] D) 2
- [ ] E) 4

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11 Simplify $12b^5x^2 \div 3b^2x$.

- ☐ A) $4b^3x$
- ☐ B) $4b^3x^2$
- ☐ C) $4b^7x^3$
- ☐ D) $4b^4x$
- ☐ E) $9b^3x$

---

12 Write 6.26×10^8 as an ordinary number.

- ☐ A) 62,600,000,000
- ☐ B) 62,600,000
- ☐ C) 6,260,000
- ☐ D) 0.0000000626
- ☐ E) 626,000,000

---

13 Fergus thinks of a number, multiplies it by 5, then adds 3. The answer is 58. What number did Fergus think of?

- ☐ A) -11
- ☐ B) 10
- ☐ C) 275
- ☐ D) 11
- ☐ E) 12

---

14 Simplify $6b^3 \times 3b^3$.

- ☐ A) $9b^6$
- ☐ B) $18b^5$
- ☐ C) $18b^6$
- ☐ D) $9b^9$
- ☐ E) $18b^9$

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15 Work out $(3 \times 10^8) \times (5 \times 10^2)$. Give your answer in standard form.

- ☐ A) 1.5×10^{12}
- ☐ B) 1.5×10^{10}
- ☐ C) 15×10^9
- ☐ D) 1.5×10^{16}
- ☐ E) 1.5×10^{11}

---

16 Dev thinks of a number, multiplies it by 9, then adds 1. The answer is 127. What number did Dev think of?

- ☐ A) 14
- ☐ B) 13
- ☐ C) 15
- ☐ D) -14
- ☐ E) 1134

---

17 Solve each equation, showing your working.

(a) Solve $3(2x - 1) = 5x + 8$. **(2)**

.....

(b) Solve $x/4 + 3 = 10$. **(2)**

.....

---

18 Write $2^8 \div 2^6$ as a single power of 2.

- ☐ A) 2^3
- ☐ B) 2^2
- ☐ C) 2^{14}
- ☐ D) 2^{-2}
- ☐ E) 1^2

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19 Write 0.0000003 in standard form.

- ☐ A) 3×10^{-8}
- ☐ B) 0.3×10^{-6}
- ☐ C) 3×10^{-6}
- ☐ D) 3×10^{-7}
- ☐ E) 30×10^{-8}

---

20 Dev thinks of a number, multiplies it by 3, then adds 9. The answer is 42. What number did Dev think of?

- ☐ A) 99
- ☐ B) 12
- ☐ C) -11
- ☐ D) 11
- ☐ E) 10

---

21 Simplify $(3a^5)^2$.

- ☐ A) $6a^7$
- ☐ B) $9a^{10}$
- ☐ C) $9a^{11}$
- ☐ D) $6a^{10}$
- ☐ E) $3a^{10}$

---

22 Work out $(7 \times 10^{-7}) \times (4 \times 10^{-5})$. Give your answer in standard form.

- ☐ A) 2.8×10^{-11}
- ☐ B) 28×10^{-12}
- ☐ C) 28×10^{-13}
- ☐ D) 2.8×10^{-12}
- ☐ E) 2.8×10^{-10}

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23 Archie thinks of a number, multiplies it by 3, then subtracts 5. The answer is 16. What number did Archie think of?

- [ ] A) 8
- [ ] B) 6
- [ ] C) 7
- [ ] D) -7
- [ ] E) 63

---

24 Write 0.00000089 in standard form.

- [ ] A) 8.9×10^{7}
- [ ] B) 0.89×10^{-6}
- [ ] C) 89×10^{-8}
- [ ] D) 8.9×10^{-6}
- [ ] E) 8.9×10^{-7}

---

25 Write 660,000,000 in standard form.

- [ ] A) 6.6×10^{7}
- [ ] B) 6.6×10^{9}
- [ ] C) 0.66×10^{9}
- [ ] D) 6.6×10^{8}
- [ ] E) 6.6×10^{-8}

---

26 Uma thinks of a number, multiplies it by 7, then adds 6. The answer is 76. What number did Uma think of?

- [ ] A) 10
- [ ] B) 11
- [ ] C) 9
- [ ] D) -10
- [ ] E) 490

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27 Solve the equation $(x+3)/4 - (x-1)/5 = 2$. Show each step of your working clearly.

(4)

---

28 Work out the value of 3^{-1}, as a fraction.

- ☐ A) -3
- ☐ B) 1/9
- ☐ C) -1/3
- ☐ D) 3
- ☐ E) 1/3

---

29 Write 0.911 in standard form.

- ☐ A) 91.1×10^{-2}
- ☐ B) 0.911×10^{0}
- ☐ C) 9.11×10^{-1}
- ☐ D) 9.11×10^{-2}
- ☐ E) 9.11×10^{0}

---

30 Hamza thinks of a number, multiplies it by 5, then subtracts 9. The answer is 31. What number did Hamza think of?

- ☐ A) 200
- ☐ B) 8
- ☐ C) 7
- ☐ D) -8
- ☐ E) 9

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31 Write $5^6 \times 5^5$ as a single power of 5.

- ☐ A) 5^{11}
- ☐ B) 5^{22}
- ☐ C) 5^{30}
- ☐ D) 5^1
- ☐ E) 5^{10}

---

32 Write 781,000,000 in standard form.

- ☐ A) 7.81×10^9
- ☐ B) 78.1×10^7
- ☐ C) 7.81×10^{-8}
- ☐ D) 7.81×10^8
- ☐ E) 0.781×10^9

---

33 Sophie thinks of a number, multiplies it by 8, then subtracts 2. The answer is 102. What number did Sophie think of?

- ☐ A) 12
- ☐ B) 14
- ☐ C) 832
- ☐ D) 12.5
- ☐ E) 13

---

34 Write $5^8 \times 5^3$ as a single power of 5.

- ☐ A) 5^{10}
- ☐ B) 5^5
- ☐ C) 5^{11}
- ☐ D) 5^{22}
- ☐ E) 5^{24}

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35 Write 0.51 in standard form.

- ☐ A) 5.1×10^{-1}
- ☐ B) 5.1×10^{0}
- ☐ C) 0.51×10^{0}
- ☐ D) 5.1×10^{-2}
- ☐ E) 5.1×10^{1}

---

36 Mohammed thinks of a number, multiplies it by 7, then adds 7. The answer is 49. What number did Mohammed think of?

- ☐ A) 8
- ☐ B) 5
- ☐ C) -6
- ☐ D) 0
- ☐ E) 6

---

37 Write $6^{5} \div 6^{3}$ as a single power of 6.

- ☐ A) 6^{15}
- ☐ B) 6^{2}
- ☐ C) 6^{3}
- ☐ D) 6^{1}
- ☐ E) 6^{-2}

---

38 Write 6.76×10^{3} as an ordinary number.

- ☐ A) 676,000
- ☐ B) 67.6
- ☐ C) 1006.76
- ☐ D) 6,760
- ☐ E) 0.00676

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39 Write $(3^2)^3$ as a single power of 3.

- ☐ A) 3^8
- ☐ B) 3^5
- ☐ C) 3^7
- ☐ D) 3^{12}
- ☐ E) 3^6

---

40 Work out $(1.3 \times 10^8) \div (5 \times 10^{-3})$. Give your answer in standard form.

- ☐ A) 2.6×10^{11}
- ☐ B) 2.6×10^{-10}
- ☐ C) 2.6×10^{10}
- ☐ D) 2.6×10^5
- ☐ E) 2.6×10^9

---

41 Freddie thinks of a number, multiplies it by 4, then subtracts 4. The answer is 44. What number did Freddie think of?

- ☐ A) -12
- ☐ B) 12
- ☐ C) 192
- ☐ D) 11
- ☐ E) 15

---

42 Work out the value of 3^{-4}, as a fraction.

- ☐ A) 1/81
- ☐ B) 1/243
- ☐ C) -12
- ☐ D) 81
- ☐ E) 1/12

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43 Work out $(4.36 \times 10^{-3}) \times (6.8 \times 10^{-4})$. Give your answer in standard form.

- [ ] A) 29.648×10^{-8}
- [ ] B) 11.16×10^{-7}
- [ ] C) 2.9648×10^{-5}
- [ ] D) 2.9648×10^{-6}
- [ ] E) 29.648×10^{-7}

---

44 Rhys thinks of a number, multiplies it by 3, then adds 4. The answer is 46. What number did Rhys think of?

- [ ] A) 13
- [ ] B) 15
- [ ] C) -14
- [ ] D) 126
- [ ] E) 14

---

45 Simplify $2x^6 \times 3x^7$.

- [ ] A) $6x^{12}$
- [ ] B) $6x^{13}$
- [ ] C) $5x^{42}$
- [ ] D) $6x^{14}$
- [ ] E) $6x^{42}$

---

46 Oliver thinks of a number, multiplies it by 8, then adds 8. The answer is 64. What number did Oliver think of?

- [ ] A) 8
- [ ] B) -7
- [ ] C) 7
- [ ] D) 448
- [ ] E) 0

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47 Simplify $12b^7y^6 \div 4by^2$.

- ☐ A) $3b^6y^4$
- ☐ B) $8b^6y^4$
- ☐ C) $3b^6y^6$
- ☐ D) $3b^7y^4$
- ☐ E) $3b^6y^5$

---

48 Work out $(3 \times 10^4) \times (8 \times 10^{-4})$. Give your answer in standard form.

- ☐ A) 2.4×10^1
- ☐ B) 24×10^{-1}
- ☐ C) 2.4×10^{-16}
- ☐ D) 2.4×10^2
- ☐ E) 11×10^0

---

49 Amira thinks of a number, multiplies it by 3, then subtracts 9. The answer is 9. What number did Amira think of?

- ☐ A) 5
- ☐ B) 7
- ☐ C) 6
- ☐ D) 12
- ☐ E) 54

---

50 Simplify $3x^2 \times 3x^6$.

- ☐ A) $6x^{12}$
- ☐ B) $9x^7$
- ☐ C) $9x^9$
- ☐ D) $9x^8$
- ☐ E) $6x^8$

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51 Write 2.25×10^1 as an ordinary number.

- [ ] A) 12.25
- [ ] B) 22.5
- [ ] C) 2.25
- [ ] D) 0.225
- [ ] E) 225

---

52 Grace thinks of a number, multiplies it by 2, then subtracts 4. The answer is 0. What number did Grace think of?

- [ ] A) 8
- [ ] B) 3
- [ ] C) 1
- [ ] D) 4
- [ ] E) 2

---

53 Work out $(2 \times 10^5) \times (4 \times 10^{-3})$. Give your answer in standard form.

- [ ] A) 8×10^{-15}
- [ ] B) 6×10^2
- [ ] C) 8×10^1
- [ ] D) 8×10^2
- [ ] E) 8×10^3

---

54 Zainab thinks of a number, multiplies it by 5, then adds 9. The answer is 59. What number did Zainab think of?

- [ ] A) 11
- [ ] B) -10
- [ ] C) 10
- [ ] D) 9
- [ ] E) 250

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55 Solve the equation $3^{2x - 1} = 27$, giving the value of x.

(3)

---

56 Jack thinks of a number, multiplies it by 2, then subtracts 1. The answer is 7. What number did Jack think of?

- ☐ A) 4.5
- ☐ B) 3
- ☐ C) -4
- ☐ D) 4
- ☐ E) 5

---

57 Write $2^9 \div 2^2$ as a single power of 2.

- ☐ A) 2^8
- ☐ B) 1^7
- ☐ C) 2^{11}
- ☐ D) 2^6
- ☐ E) 2^7

---

58 Write 6,500 in standard form.

- ☐ A) 6.5×10^3
- ☐ B) 6.5×10^4
- ☐ C) 6.5×10^{-3}
- ☐ D) 6.5×10^2
- ☐ E) 65×10^2

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59 Grace thinks of a number, multiplies it by 8, then subtracts 2. The answer is 110. What number did Grace think of?

- [ ] A) 13.5
- [ ] B) 14
- [ ] C) 15
- [ ] D) 13
- [ ] E) -14

---

60 Write $(3^2)^5$ as a single power of 3.

- [ ] A) 3^{32}
- [ ] B) 3^9
- [ ] C) 3^{11}
- [ ] D) 3^{10}
- [ ] E) 3^{20}

---

61 Write 8.01×10^8 as an ordinary number.

- [ ] A) 8,010,000,000
- [ ] B) 801,000,000
- [ ] C) 100000008.01
- [ ] D) 80,100,000
- [ ] E) 80,100,000,000

---

62 Priya thinks of a number, multiplies it by 6, then adds 9. The answer is 75. What number did Priya think of?

- [ ] A) 11
- [ ] B) 14
- [ ] C) 12
- [ ] D) -11
- [ ] E) 3.5

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63 Write $7^4 \times 7^5$ as a single power of 7.

- ☐ A) 7^{10}
- ☐ B) 7^{-1}
- ☐ C) 7^9
- ☐ D) 7^{20}
- ☐ E) 7^{18}

---

64 Chloe thinks of a number, multiplies it by 8, then adds 9. The answer is 81. What number did Chloe think of?

- ☐ A) 9
- ☐ B) 576
- ☐ C) -9
- ☐ D) 8
- ☐ E) 10

---

65 Write $(5^3)^3$ as a single power of 5.

- ☐ A) 5^{18}
- ☐ B) 5^{27}
- ☐ C) 5^9
- ☐ D) 5^{10}
- ☐ E) 5^6

---

66 Write 8.6×10^7 as an ordinary number.

- ☐ A) 860,000
- ☐ B) 86,000,000
- ☐ C) 860,000,000
- ☐ D) 10000008.6
- ☐ E) 8,600,000,000

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67 Zainab thinks of a number, multiplies it by 5, then subtracts 1. The answer is 24. What number did Zainab think of?

- [ ] A) 4
- [ ] B) 6
- [ ] C) 125
- [ ] D) 5
- [ ] E) -5

---

68 Simplify $(4b^5)^2$.

- [ ] A) $8b^{10}$
- [ ] B) $4b^{10}$
- [ ] C) $16b^7$
- [ ] D) $8b^7$
- [ ] E) $16b^{10}$

---

69 Write 2,500,000 in standard form.

- [ ] A) 25×10^5
- [ ] B) 2.5×10^7
- [ ] C) 2.5×10^5
- [ ] D) 2.5×10^6
- [ ] E) 2.5×10^{-6}

---

70 Oliver thinks of a number, multiplies it by 9, then subtracts 8. The answer is 109. What number did Oliver think of?

- [ ] A) 14
- [ ] B) 1053
- [ ] C) -13
- [ ] D) 12
- [ ] E) 13

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71 Work out the value of 4^{-1}, as a fraction.

- [ ] A) -4
- [ ] B) 1/4
- [ ] C) 1/16
- [ ] D) -1/4
- [ ] E) 4

---

72 Write 8,060,000 in standard form.

- [ ] A) 8.06×10^{-6}
- [ ] B) 0.806×10^{7}
- [ ] C) 8.06×10^{6}
- [ ] D) 8.06×10^{7}
- [ ] E) 8.06×10^{5}

---

73 Chloe thinks of a number, multiplies it by 7, then adds 7. The answer is 35. What number did Chloe think of?

- [ ] A) 4
- [ ] B) 3
- [ ] C) -4
- [ ] D) 196
- [ ] E) 6

---

74 Write $6^{7} \div 6^{4}$ as a single power of 6.

- [ ] A) 6^{4}
- [ ] B) 6^{3}
- [ ] C) 1^{3}
- [ ] D) 6^{-3}
- [ ] E) 6^{2}

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75 Write 7.1×10^3 as an ordinary number.

- [ ] A) 71,000
- [ ] B) 710,000
- [ ] C) 710
- [ ] D) 7,100
- [ ] E) 0.0071

---

76 Harriet thinks of a number, multiplies it by 6, then adds 3. The answer is 21. What number did Harriet think of?

- [ ] A) 4
- [ ] B) 0.5
- [ ] C) 2
- [ ] D) -3
- [ ] E) 3

---

77 Simplify $16a^9x^3 \div 4a^3x$.

- [ ] A) $4a^6x^2$
- [ ] B) $12a^6x^2$
- [ ] C) $4a^{12}x^4$
- [ ] D) $4a^6x^3$
- [ ] E) $4a^3x^2$

---

78 Write 1.36×10^{-2} as an ordinary number.

- [ ] A) 0.136
- [ ] B) 0.00136
- [ ] C) 0.0136
- [ ] D) 1.36
- [ ] E) 136

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79 Freddie thinks of a number, multiplies it by 4, then subtracts 7. The answer is 17. What number did Freddie think of?

- [ ] A) 6
- [ ] B) -6
- [ ] C) 5
- [ ] D) 7
- [ ] E) 2.5

---

80 Write $2^4 \div 2^2$ as a single power of 2.

- [ ] A) 2^3
- [ ] B) 2^6
- [ ] C) 2^1
- [ ] D) 2^{-2}
- [ ] E) 2^2

---

81 Write 13,000,000 in standard form.

- [ ] A) 1.3×10^8
- [ ] B) 1.3×10^{-7}
- [ ] C) 0.13×10^8
- [ ] D) 1.3×10^7
- [ ] E) 1.3×10^6

---

82 Eleni thinks of a number, multiplies it by 7, then adds 5. The answer is 54. What number did Eleni think of?

- [ ] A) 6
- [ ] B) 7
- [ ] C) -7
- [ ] D) 343
- [ ] E) 8

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83 Write $(5^8)^6$ as a single power of 5.

- ☐ A) 5^{96}
- ☐ B) 5^{49}
- ☐ C) 5^{48}
- ☐ D) 5^{47}
- ☐ E) 5^{15}

---

84 Work out $(7.18 \times 10^{-4}) \times (6 \times 10^{-2})$. Give your answer in standard form.

- ☐ A) 4.308×10^{-5}
- ☐ B) 43.08×10^{-6}
- ☐ C) 4.308×10^{-6}
- ☐ D) 13.18×10^{-6}
- ☐ E) 4.308×10^{8}

---

85 Kwame thinks of a number, multiplies it by 2, then adds 1. The answer is 13. What number did Kwame think of?

- ☐ A) 7
- ☐ B) 24
- ☐ C) 5
- ☐ D) 5.5
- ☐ E) 6

---

86 Simplify $5y^5 \times 3y^6$.

- ☐ A) $8y^{11}$
- ☐ B) $15y^{12}$
- ☐ C) $15y^{11}$
- ☐ D) $8y^{30}$
- ☐ E) $15y^{30}$

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87 Write 0.028 in standard form.

- ☐ A) 2.8×10^{-1}
- ☐ B) 2.8×10^{-2}
- ☐ C) 2.8×10^{2}
- ☐ D) 28×10^{-3}
- ☐ E) 0.28×10^{-1}

---

88 Freddie thinks of a number, multiplies it by 4, then subtracts 5. The answer is 31. What number did Freddie think of?

- ☐ A) 10
- ☐ B) -9
- ☐ C) 6.5
- ☐ D) 9
- ☐ E) 8

---

89 Simplify $3p^3 \times 5p^2$.

- ☐ A) $15p^5$
- ☐ B) $15p^4$
- ☐ C) $15p^6$
- ☐ D) $8p^6$
- ☐ E) $8p^5$

---

90 Write 9.4×10^3 as an ordinary number.

- ☐ A) 94,000
- ☐ B) 940
- ☐ C) 9,400
- ☐ D) 94
- ☐ E) 1009.4

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91 Harriet thinks of a number, multiplies it by 8, then adds 4. The answer is 116. What number did Harriet think of?

- [ ] A) 15
- [ ] B) 14
- [ ] C) 896
- [ ] D) 10.5
- [ ] E) -14

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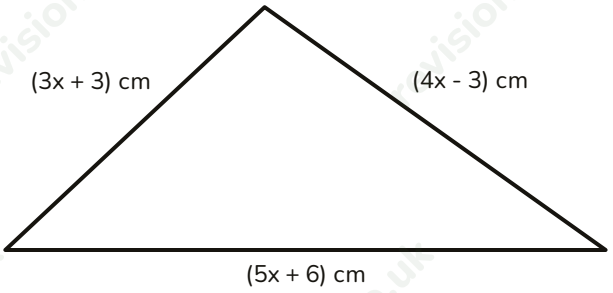
92 Simplify $3x^3 \times 2x^7$.

- [ ] A) $6x^{11}$
- [ ] B) $5x^{21}$
- [ ] C) $6x^9$
- [ ] D) $6x^{10}$
- [ ] E) $6x^{21}$

---

93 A triangle has sides of length (5x + 6) cm, (4x - 3) cm and (3x + 3) cm. Its perimeter is 174 cm. What is the value of x?

Diagram NOT accurately drawn



- [ ] A) x = 14.5
- [ ] B) x = 14
- [ ] C) x = 15
- [ ] D) x = 8.5
- [ ] E) x = -14

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94 Write $(5^4)^3$ as a single power of 5.

- ☐ A) 5^{64}
- ☐ B) 5^{13}
- ☐ C) 5^{11}
- ☐ D) 5^{12}
- ☐ E) 5^{24}

---

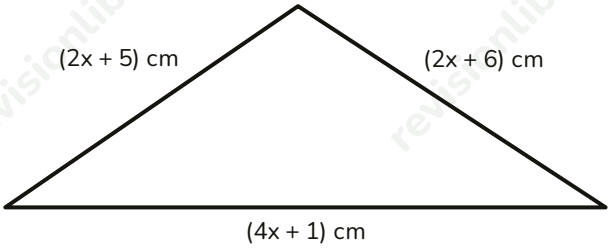
95 Work out $(2 \times 10^{-5}) \times (7 \times 10^{-1})$. Give your answer in standard form.

- ☐ A) 14×10^{-7}
- ☐ B) 14×10^{-6}
- ☐ C) 1.4×10^{-5}
- ☐ D) 9×10^{-6}
- ☐ E) 1.4×10^{5}

---

96 A triangle has sides of length (4x + 1) cm, (2x + 6) cm and (2x + 5) cm. Its perimeter is 108 cm. What is the value of x?

Diagram NOT accurately drawn



- ☐ A) x = -12
- ☐ B) x = 15
- ☐ C) x = 32
- ☐ D) x = 13.5
- ☐ E) x = 12

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97 Write $(8^5)^3$ as a single power of 8.

- ☐ A) 8^{15}
- ☐ B) 8^{14}
- ☐ C) 8^{16}
- ☐ D) 8^9
- ☐ E) 8^{30}

---

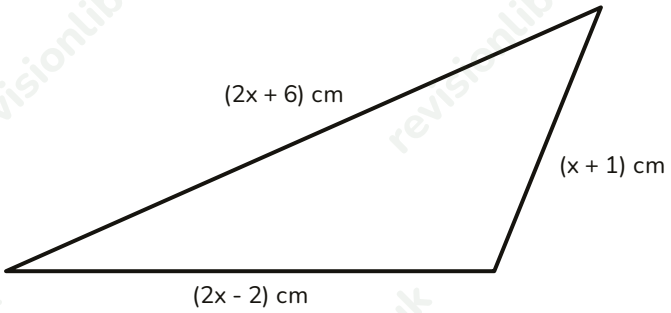
98 Write 610,000 in standard form.

- ☐ A) 61×10^4
- ☐ B) 6.1×10^{-5}
- ☐ C) 6.1×10^4
- ☐ D) 6.1×10^5
- ☐ E) 6.1×10^6

---

99 A triangle has sides of length (2x - 2) cm, (x + 1) cm and (2x + 6) cm. Its perimeter is 70 cm. What is the value of x?

Diagram NOT accurately drawn



- ☐ A) x = -13
- ☐ B) x = 15
- ☐ C) x = 13
- ☐ D) x = 9
- ☐ E) x = 14

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100 Work out the value of 4^{-2}, as a fraction.

- [ ] A) -8
- [ ] B) -1/16
- [ ] C) 1/8
- [ ] D) -16
- [ ] E) 1/16

---

101 Work out $(3 \times 10^4) \times (3 \times 10^2)$. Give your answer in standard form.

- [ ] A) 9×10^6
- [ ] B) 9×10^8
- [ ] C) 6×10^6
- [ ] D) 9×10^7
- [ ] E) 9×10^5

---

102 Eleni thinks of a number, multiplies it by 6, then subtracts 1. The answer is 77. What number did Eleni think of?

- [ ] A) 468
- [ ] B) 13
- [ ] C) 12
- [ ] D) 14
- [ ] E) -13

---

103 Simplify $20a^8y^3 \div 5a^2y^2$.

- [ ] A) $4a^{10}y^5$
- [ ] B) $4a^6y$
- [ ] C) $4a^6y^3$
- [ ] D) $4a^4y$
- [ ] E) $15a^6y$

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104 Work out $(8 \times 10^{-4}) \times (3 \times 10^{3})$. Give your answer in standard form.

- ☐ A) 2.4×10^{0}
- ☐ B) 11×10^{-1}
- ☐ C) 2.4×10^{-12}
- ☐ D) 24×10^{-2}
- ☐ E) 2.4×10^{1}

---

105 Ben thinks of a number, multiplies it by 6, then adds 1. The answer is 67. What number did Ben think of?

- ☐ A) 396
- ☐ B) -11
- ☐ C) 12
- ☐ D) 11
- ☐ E) 10

---

106 Write $8^{8} \div 8^{6}$ as a single power of 8.

- ☐ A) 8^{14}
- ☐ B) 8^{-2}
- ☐ C) 8^{2}
- ☐ D) 1^{2}
- ☐ E) 8^{48}

---

107 Write 1,700 in standard form.

- ☐ A) 0.17×10^{4}
- ☐ B) 17×10^{2}
- ☐ C) 1.7×10^{4}
- ☐ D) 1.7×10^{-3}
- ☐ E) 1.7×10^{3}

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108 Zainab thinks of a number, multiplies it by 5, then subtracts 7. The answer is 18. What number did Zainab think of?

- [ ] A) 125
- [ ] B) 6
- [ ] C) -5
- [ ] D) 4
- [ ] E) 5

---

109 Write $7^6 \div 7^5$ as a single power of 7.

- [ ] A) 7^2
- [ ] B) 7^{30}
- [ ] C) 7^1
- [ ] D) 1^1
- [ ] E) 7^{11}

---

110 Write 7.3×10^4 as an ordinary number.

- [ ] A) 730
- [ ] B) 10007.3
- [ ] C) 7,300
- [ ] D) 73,000
- [ ] E) 7,300,000

---

111 Kwame thinks of a number, multiplies it by 8, then subtracts 6. The answer is 82. What number did Kwame think of?

- [ ] A) 11
- [ ] B) 10
- [ ] C) 9.5
- [ ] D) 12
- [ ] E) 704

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112 Simplify $3a^3 \times 4a^4$.

- [ ] A) $12a^{12}$
- [ ] B) $12a^7$
- [ ] C) $7a^{12}$
- [ ] D) $12a^6$
- [ ] E) $12a^8$

---

113 Work out $(2 \times 10^5) \times (6 \times 10^6)$. Give your answer in standard form.

- [ ] A) 1.2×10^{13}
- [ ] B) 1.2×10^{12}
- [ ] C) 8×10^{11}
- [ ] D) 1.2×10^{30}
- [ ] E) 1.2×10^{11}

---

114 Kiran thinks of a number, multiplies it by 5, then adds 2. The answer is 22. What number did Kiran think of?

- [ ] A) 5
- [ ] B) 3
- [ ] C) 4
- [ ] D) 100
- [ ] E) -4

---

115 Write $9^9 \div 9^3$ as a single power of 9.

- [ ] A) 9^{27}
- [ ] B) 9^5
- [ ] C) 9^{12}
- [ ] D) 9^7
- [ ] E) 9^6

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116 Work out $(7 \times 10^6) \div (2 \times 10^{-2})$. Give your answer in standard form.

- ☐ A) 3.5×10^9
- ☐ B) 3.5×10^4
- ☐ C) $2/7 \times 10^{-8}$
- ☐ D) 3.5×10^8
- ☐ E) 3.5×10^7

---

117 Fergus thinks of a number, multiplies it by 2, then subtracts 2. The answer is 8. What number did Fergus think of?

- ☐ A) 5
- ☐ B) 4
- ☐ C) 6
- ☐ D) 3
- ☐ E) -5

---

118 Simplify $4y^6 \times 5y^3$.

- ☐ A) $20y^9$
- ☐ B) $9y^9$
- ☐ C) $9y^{18}$
- ☐ D) $20y^8$
- ☐ E) $20y^{18}$

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119 Work out $(8 \times 10^{-1}) \times (5 \times 10^{2})$. Give your answer in standard form.

- ☐ A) 40×10^{0}
- ☐ B) 4×10^{2}
- ☐ C) 4×10^{3}
- ☐ D) 4×10^{1}
- ☐ E) 4×10^{-2}

---

120 Oliver thinks of a number, multiplies it by 3, then adds 1. The answer is 40. What number did Oliver think of?

- ☐ A) 14
- ☐ B) 12
- ☐ C) -13
- ☐ D) 13
- ☐ E) 117

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Mark scheme · 2.16 Number, Ratio and Algebra Depth: 2-hour Pack

Question 1

D cao (3.337×10^{13}); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: D) 3.337×10^{13}

Question 2

A cao (3); form an equation, then solve it **B1**

Answer: A) 3

Question 3

B cao (6^{13}); add the powers **B1**

Answer: B) 6^{13}

Question 4

C cao (2.125×10^{-7}); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: C) 2.125×10^{-7}

Question 5

E cao (x = 8); form an equation, then solve it **B1**

Answer: E) x = 8

Question 6

D cao (6^{3}); subtract the powers **B1**

Answer: D) 6^{3}

Question 7

B cao (4,700); move the decimal point **B1**

Answer: B) 4,700

Question 8

C cao (6); form an equation, then solve it **B1**

Answer: C) 6

Question 9

A cao (2^{10}); add the powers **B1**

Answer: A) 2^{10}

Question 10

B cao (3); form an equation, then solve it **B1**

Answer: B) 3

Question 11

A cao ($4b^{3}x$); divide the numbers, subtract the powers **B1**

Answer: A) $4b^{3}x$

Question 12

E cao (626,000,000); move the decimal point **B1**

Answer: E) 626,000,000

Question 13

D cao (11); form an equation, then solve it **B1**

Answer: D) 11

Question 14

C cao ($18b^{6}$); multiply the numbers, add the powers **B1**

Answer: C) $18b^{6}$

Question 15

E cao (1.5×10^{11}); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: E) 1.5×10^{11}

Question 16

A cao (14); form an equation, then solve it **B1**

Answer: A) 14

Question 17

(a) 6x - 3 = 5x + 8 (bracket expanded) **M1**

(a) x = 11 cao **A1**

(a) Answer: x = 11

(b) x/4 = 7 seen **M1**

(b) x = 28 cao **A1**

(b) Answer: x = 28

Question 18

B cao (2^{2}); subtract the powers **B1**

Answer: B) 2^{2}

Question 19

D cao (3×10^{-7}); move the decimal point to give a number from 1 to 10 **B1**

Answer: D) 3×10^{-7}

Question 20

D cao (11); form an equation, then solve it **B1**

Answer: D) 11

Question 21

B cao ($9a^{10}$); raise the number and multiply the powers **B1**

Answer: B) $9a^{10}$

Question 22

A cao (2.8×10^{-11}); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: A) 2.8×10^{-11}

Question 23

C cao (7); form an equation, then solve it **B1**

Answer: C) 7

Question 24

E cao (8.9×10^{-7}); move the decimal point to give a number from 1 to 10 **B1**

Answer: E) 8.9×10^{-7}

Question 25

D cao (6.6×10^{8}); move the decimal point to give a number from 1 to 10 **B1**

Answer: D) 6.6×10^{8}

Question 26

A cao (10); form an equation, then solve it **B1**

Answer: A) 10

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Question 27

multiplies every term by 20, the LCM of 4 and 5: 5(x+3) - 4(x-1) = 40 **M1**

expands both brackets: 5x + 15 - 4x + 4 = 40 **M1**

simplifies to x + 19 = 40 (dependent on previous method) **dM1**

x = 21 cao **A1**

Answer: x = 21

Question 28

E cao (1/3); a negative power means the reciprocal **B1**

Answer: E) 1/3

Question 29

C cao (9.11×10^{-1}); move the decimal point to give a number from 1 to 10 **B1**

Answer: C) 9.11×10^{-1}

Question 30

B cao (8); form an equation, then solve it **B1**

Answer: B) 8

Question 31

A cao (5^{11}); add the powers **B1**

Answer: A) 5^{11}

Question 32

D cao (7.81×10^{8}); move the decimal point to give a number from 1 to 10 **B1**

Answer: D) 7.81×10^{8}

Question 33

E cao (13); form an equation, then solve it **B1**

Answer: E) 13

Question 34

C cao (5^{11}); add the powers **B1**

Answer: C) 5^{11}

Question 35

A cao (5.1×10^{-1}); move the decimal point to give a number from 1 to 10 **B1**

Answer: A) 5.1×10^{-1}

Question 36

E cao (6); form an equation, then solve it **B1**

Answer: E) 6

Question 37

B cao (6^{2}); subtract the powers **B1**

Answer: B) 6^{2}

Question 38

D cao (6,760); move the decimal point **B1**

Answer: D) 6,760

Question 39

E cao (3^{6}); multiply the powers **B1**

Answer: E) 3^{6}

Question 40

C cao (2.6×10^{10}); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: C) 2.6×10^{10}

Question 41

B cao (12); form an equation, then solve it **B1**

Answer: B) 12

Question 42

A cao (1/81); a negative power means the reciprocal **B1**

Answer: A) 1/81

Question 43

D cao (2.9648×10^{-6}); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: D) 2.9648×10^{-6}

Question 44

E cao (14); form an equation, then solve it **B1**

Answer: E) 14

Question 45

B cao ($6x^{13}$); multiply the numbers, add the powers **B1**

Answer: B) $6x^{13}$

Question 46

C cao (7); form an equation, then solve it **B1**

Answer: C) 7

Question 47

A cao ($3b^{6}y^{4}$); divide the numbers, subtract the powers **B1**

Answer: A) $3b^{6}y^{4}$

Question 48

A cao (2.4×10^{1}); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: A) 2.4×10^{1}

Question 49

C cao (6); form an equation, then solve it **B1**

Answer: C) 6

Question 50

D cao ($9x^{8}$); multiply the numbers, add the powers **B1**

Answer: D) $9x^{8}$

Question 51

B cao (22.5); move the decimal point **B1**

Answer: B) 22.5

Question 52

E cao (2); form an equation, then solve it **B1**

Answer: E) 2

Question 53

D cao (8×10^{2}); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: D) 8×10^{2}

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Question 54

C cao (10); form an equation, then solve it **B1**

Answer: C) 10

Question 55

writes 27 as a power of 3: $27 = 3^3$ **M1**

sets 2x - 1 = 3 (equates the indices) **M1**

x = 2 cao **A1**

Answer: x = 2

Question 56

D cao (4); form an equation, then solve it **B1**

Answer: D) 4

Question 57

E cao (2^7); subtract the powers **B1**

Answer: E) 2^7

Question 58

A cao (6.5×10^3); move the decimal point to give a number from 1 to 10 **B1**

Answer: A) 6.5×10^3

Question 59

B cao (14); form an equation, then solve it **B1**

Answer: B) 14

Question 60

D cao (3^{10}); multiply the powers **B1**

Answer: D) 3^{10}

Question 61

B cao (801,000,000); move the decimal point **B1**

Answer: B) 801,000,000

Question 62

A cao (11); form an equation, then solve it **B1**

Answer: A) 11

Question 63

C cao (7^9); add the powers **B1**

Answer: C) 7^9

Question 64

A cao (9); form an equation, then solve it **B1**

Answer: A) 9

Question 65

C cao (5^9); multiply the powers **B1**

Answer: C) 5^9

Question 66

B cao (86,000,000); move the decimal point **B1**

Answer: B) 86,000,000

Question 67

D cao (5); form an equation, then solve it **B1**

Answer: D) 5

Question 68

E cao ($16b^{10}$); raise the number and multiply the powers **B1**

Answer: E) $16b^{10}$

Question 69

D cao (2.5×10^6); move the decimal point to give a number from 1 to 10 **B1**

Answer: D) 2.5×10^6

Question 70

E cao (13); form an equation, then solve it **B1**

Answer: E) 13

Question 71

B cao (1/4); a negative power means the reciprocal **B1**

Answer: B) 1/4

Question 72

C cao (8.06×10^6); move the decimal point to give a number from 1 to 10 **B1**

Answer: C) 8.06×10^6

Question 73

A cao (4); form an equation, then solve it **B1**

Answer: A) 4

Question 74

B cao (6^3); subtract the powers **B1**

Answer: B) 6^3

Question 75

D cao (7,100); move the decimal point **B1**

Answer: D) 7,100

Question 76

E cao (3); form an equation, then solve it **B1**

Answer: E) 3

Question 77

A cao ($4a^6x^2$); divide the numbers, subtract the powers **B1**

Answer: A) $4a^6x^2$

Question 78

C cao (0.0136); move the decimal point **B1**

Answer: C) 0.0136

Question 79

A cao (6); form an equation, then solve it **B1**

Answer: A) 6

Question 80

E cao (2^2); subtract the powers **B1**

Answer: E) 2^2

Question 81

D cao (1.3×10^7); move the decimal point to give a number from 1 to 10 **B1**

Answer: D) 1.3×10^7

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Question 82

B cao (7); form an equation, then solve it **B1**

Answer: B) 7

Question 83

C cao (5^{48}); multiply the powers **B1**

Answer: C) 5^{48}

Question 84

A cao (4.308×10^{-5}); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: A) 4.308×10^{-5}

Question 85

E cao (6); form an equation, then solve it **B1**

Answer: E) 6

Question 86

C cao ($15y^{11}$); multiply the numbers, add the powers **B1**

Answer: C) $15y^{11}$

Question 87

B cao (2.8×10^{-2}); move the decimal point to give a number from 1 to 10 **B1**

Answer: B) 2.8×10^{-2}

Question 88

D cao (9); form an equation, then solve it **B1**

Answer: D) 9

Question 89

A cao ($15p^5$); multiply the numbers, add the powers **B1**

Answer: A) $15p^5$

Question 90

C cao (9,400); move the decimal point **B1**

Answer: C) 9,400

Question 91

B cao (14); form an equation, then solve it **B1**

Answer: B) 14

Question 92

D cao ($6x^{10}$); multiply the numbers, add the powers **B1**

Answer: D) $6x^{10}$

Question 93

B cao (x = 14); form an equation, then solve it **B1**

Answer: B) x = 14

Question 94

D cao (5^{12}); multiply the powers **B1**

Answer: D) 5^{12}

Question 95

C cao (1.4×10^{-5}); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: C) 1.4×10^{-5}

Question 96

E cao (x = 12); form an equation, then solve it **B1**

Answer: E) x = 12

Question 97

A cao (8^{15}); multiply the powers **B1**

Answer: A) 8^{15}

Question 98

D cao (6.1×10^5); move the decimal point to give a number from 1 to 10 **B1**

Answer: D) 6.1×10^5

Question 99

C cao (x = 13); form an equation, then solve it **B1**

Answer: C) x = 13

Question 100

E cao (1/16); a negative power means the reciprocal **B1**

Answer: E) 1/16

Question 101

A cao (9×10^6); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: A) 9×10^6

Question 102

B cao (13); form an equation, then solve it **B1**

Answer: B) 13

Question 103

B cao ($4a^6y$); divide the numbers, subtract the powers **B1**

Answer: B) $4a^6y$

Question 104

A cao (2.4×10^0); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: A) 2.4×10^0

Question 105

D cao (11); form an equation, then solve it **B1**

Answer: D) 11

Question 106

C cao (8^2); subtract the powers **B1**

Answer: C) 8^2

Question 107

E cao (1.7×10^3); move the decimal point to give a number from 1 to 10 **B1**

Answer: E) 1.7×10^3

Question 108

E cao (5); form an equation, then solve it **B1**

Answer: E) 5

Question 109

C cao (7^1); subtract the powers **B1**

Answer: C) 7^1

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Question 110

D cao (73,000); move the decimal point **B1**

Answer: D) 73,000

Question 111

A cao (11); form an equation, then solve it **B1**

Answer: A) 11

Question 112

B cao ($12a^7$); multiply the numbers, add the powers **B1**

Answer: B) $12a^7$

Question 113

B cao (1.2×10^{12}); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: B) 1.2×10^{12}

Question 114

C cao (4); form an equation, then solve it **B1**

Answer: C) 4

Question 115

E cao (9^6); subtract the powers **B1**

Answer: E) 9^6

Question 116

D cao (3.5×10^8); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: D) 3.5×10^8

Question 117

A cao (5); form an equation, then solve it **B1**

Answer: A) 5

Question 118

A cao ($20y^9$); multiply the numbers, add the powers **B1**

Answer: A) $20y^9$

Question 119

B cao (4×10^2); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: B) 4×10^2

Question 120

D cao (13); form an equation, then solve it **B1**

Answer: D) 13

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