2.16 Number, Ratio and Algebra Depth: 1-hour Pack

ISEB CE 13+ Mathematics · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Isla thinks of a number, multiplies it by 2, then subtracts 8. The answer is 6. What number did Isla think of?

- ☐ A) 8
- ☐ B) 11
- ☐ C) -7
- ☐ D) 6
- ☐ E) 7

---

2 Simplify $(3y^4)^3$.

- ☐ A) $27y^{13}$
- ☐ B) $3y^{12}$
- ☐ C) $27y^{12}$
- ☐ D) $9y^7$
- ☐ E) $27y^7$

---

3 Write 3.13×10^{-4} as an ordinary number.

- ☐ A) 31,300
- ☐ B) 0.0000313
- ☐ C) 3.13
- ☐ D) 0.00313
- ☐ E) 0.000313

© Revision Library | revisionlibrary.co.uk

4 Work out the value of 10^{-3}, as a fraction.

- [ ] A) -1/1000
- [ ] B) 1000
- [ ] C) -1000
- [ ] D) 1/1000
- [ ] E) -30

---

5 Write 9,500 in standard form.

- [ ] A) 9.5×10^{4}
- [ ] B) 9.5×10^{3}
- [ ] C) 9.5×10^{-3}
- [ ] D) 9.5×10^{2}
- [ ] E) 95×10^{2}

---

6 Kiran thinks of a number, multiplies it by 5, then subtracts 4. The answer is 66. What number did Kiran think of?

- [ ] A) -14
- [ ] B) 13
- [ ] C) 14
- [ ] D) 15
- [ ] E) 350

---

7 Write $(9^{2})^{3}$ as a single power of 9.

- [ ] A) 9^{6}
- [ ] B) 9^{12}
- [ ] C) 9^{8}
- [ ] D) 9^{5}
- [ ] E) 9^{7}

© Revision Library | revisionlibrary.co.uk

8 Write 7.8×10^3 as an ordinary number.

- [ ] A) 780,000
- [ ] B) 7,800
- [ ] C) 78,000
- [ ] D) 0.0078
- [ ] E) 780

---

9 Isla thinks of a number, multiplies it by 9, then subtracts 7. The answer is 92. What number did Isla think of?

- [ ] A) 10
- [ ] B) -11
- [ ] C) 11
- [ ] D) 12
- [ ] E) 891

---

10 Write $(9^4)^3$ as a single power of 9.

- [ ] A) 9^{24}
- [ ] B) 9^{13}
- [ ] C) 9^{64}
- [ ] D) 9^{12}
- [ ] E) 9^{11}

---

11 Write 2.54×10^{-1} as an ordinary number.

- [ ] A) 2.54
- [ ] B) 0.00254
- [ ] C) 25.4
- [ ] D) 0.0254
- [ ] E) 0.254

© Revision Library | revisionlibrary.co.uk

12 Dev thinks of a number, multiplies it by 6, then adds 9. The answer is 69. What number did Dev think of?

- ☐ A) 9
- ☐ B) 360
- ☐ C) 10
- ☐ D) 2.5
- ☐ E) 13

---

13 Simplify $(4b^4)^4$.

- ☐ A) $256b^8$
- ☐ B) $256b^{16}$
- ☐ C) $256b^{17}$
- ☐ D) $16b^8$
- ☐ E) $16b^{16}$

---

14 Work out $(9 \times 10^{-3}) \times (7 \times 10^{-2})$. Give your answer in standard form.

- ☐ A) 63×10^{-6}
- ☐ B) 6.3×10^{-5}
- ☐ C) 6.3×10^{-3}
- ☐ D) 6.3×10^{-4}
- ☐ E) 63×10^{-5}

---

15 Siobhan thinks of a number, multiplies it by 2, then subtracts 8. The answer is 14. What number did Siobhan think of?

- ☐ A) 11
- ☐ B) 44
- ☐ C) 3
- ☐ D) 12
- ☐ E) 15

© Revision Library | revisionlibrary.co.uk

16 Simplify $12b^8x^4 \div 4b^3x^2$.

- ☐ A) $3b^6x^2$
- ☐ B) $3b^5x^4$
- ☐ C) $3b^8x^2$
- ☐ D) $8b^5x^2$
- ☐ E) $3b^5x^2$

---

17 Work out $(9 \times 10^{-6}) \times (3 \times 10^{-5})$. Give your answer in standard form.

- ☐ A) 2.7×10^{-10}
- ☐ B) 2.7×10^{30}
- ☐ C) 2.7×10^{-9}
- ☐ D) 27×10^{-12}
- ☐ E) 12×10^{-11}

---

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

- ☐ A) -64
- ☐ B) 64
- ☐ C) 1/64
- ☐ D) 1/256
- ☐ E) -12

---

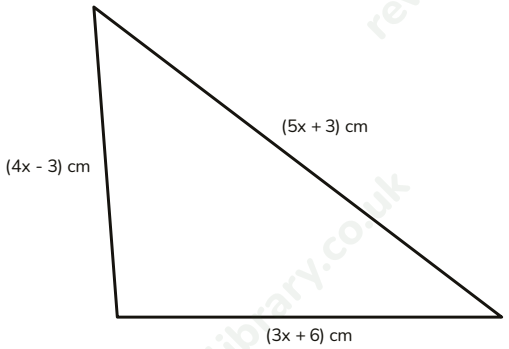
19 Work out $(1.6 \times 10^6) \div (4 \times 10^{-4})$. Give your answer in standard form.

- ☐ A) 4×10^{10}
- ☐ B) 4×10^8
- ☐ C) 4×10^{-9}
- ☐ D) 2.5×10^{-10}
- ☐ E) 4×10^9

© Revision Library | revisionlibrary.co.uk

20 A triangle has sides of length (3x + 6) cm, (5x + 3) cm and (4x - 3) cm. Its perimeter is 66 cm. What is the value of x?

Diagram NOT accurately drawn



- ☐ A) x = 6
- ☐ B) x = 5
- ☐ C) x = 5.5
- ☐ D) x = -5
- ☐ E) x = -0.5

---

21 Simplify $6x^6 \times 4x^2$.

- ☐ A) $10x^8$
- ☐ B) $24x^{12}$
- ☐ C) $24x^8$
- ☐ D) $24x^7$
- ☐ E) $24x^9$

---

22 Write 592,000 in standard form.

- ☐ A) 5.92×10^4
- ☐ B) 5.92×10^{-5}
- ☐ C) 5.92×10^6
- ☐ D) 59.2×10^4
- ☐ E) 5.92×10^5

© Revision Library | revisionlibrary.co.uk

23 Chloe thinks of a number, multiplies it by 7, then adds 1. The answer is 85. What number did Chloe think of?

- ☐ A) -12
- ☐ B) 12
- ☐ C) 13
- ☐ D) 11
- ☐ E) 588

---

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

- ☐ A) 8^{50}
- ☐ B) 8^{11}
- ☐ C) 8^{10}
- ☐ D) 8^{25}
- ☐ E) 8^{26}

---

25 Write 7.05×10^{-3} as an ordinary number.

- ☐ A) 0.00705
- ☐ B) 0.0000705
- ☐ C) 0.705
- ☐ D) 7.05
- ☐ E) 0.0705

---

26 Freddie thinks of a number, multiplies it by 2, then subtracts 3. The answer is 17. What number did Freddie think of?

- ☐ A) 9
- ☐ B) 7
- ☐ C) 40
- ☐ D) 10
- ☐ E) -10

© Revision Library | revisionlibrary.co.uk

27 Work out the value of 5^{-1}, as a fraction.

- ☐ A) -5
- ☐ B) -1/5
- ☐ C) 1/5
- ☐ D) 5
- ☐ E) 1/25

---

28 Work out $(2.6 \times 10^{-2}) \div (8 \times 10^{-4})$. Give your answer in standard form.

- ☐ A) 3.25×10^{0}
- ☐ B) 3.25×10^{-1}
- ☐ C) $40/13 \times 10^{-2}$
- ☐ D) 3.25×10^{-6}
- ☐ E) 3.25×10^{1}

---

29 The energy, E joules, stored in a stretched spring is directly proportional to the square of its extension, x cm. When the extension is 3 cm, the stored energy is 45 joules.

(a) Find the value of k in the formula $E = kx^2$. **(2)**

.....

(b) Calculate the energy stored when the extension is 6 cm. **(2)**

.....

---

30 Oliver thinks of a number, multiplies it by 3, then subtracts 8. The answer is 19. What number did Oliver think of?

- ☐ A) 9
- ☐ B) 81
- ☐ C) 8
- ☐ D) -9
- ☐ E) 10

© Revision Library | revisionlibrary.co.uk

31 Simplify $5p^5 \times 6p^6$.

- [ ] A) $11p^{11}$
- [ ] B) $30p^{11}$
- [ ] C) $30p^{10}$
- [ ] D) $30p^{12}$
- [ ] E) $30p^{30}$

---

32 Zainab thinks of a number, multiplies it by 6, then subtracts 2. The answer is 10. What number did Zainab think of?

- [ ] A) 2
- [ ] B) 1
- [ ] C) 72
- [ ] D) -2
- [ ] E) 3

---

33 Simplify $7b^2 \times 5b^5$.

- [ ] A) $12b^{10}$
- [ ] B) $35b^{10}$
- [ ] C) $12b^7$
- [ ] D) $35b^7$
- [ ] E) $35b^6$

---

34 Write 9.7×10^3 as an ordinary number.

- [ ] A) 0.0097
- [ ] B) 97
- [ ] C) 97,000
- [ ] D) 970,000
- [ ] E) 9,700

© Revision Library | revisionlibrary.co.uk

35 Harriet thinks of a number, multiplies it by 3, then adds 2. The answer is 41. What number did Harriet think of?

- [ ] A) 12
- [ ] B) 117
- [ ] C) 13
- [ ] D) -13
- [ ] E) 14

---

36 Write $5^9 \times 5^6$ as a single power of 5.

- [ ] A) 5^{14}
- [ ] B) 5^{15}
- [ ] C) 5^{54}
- [ ] D) 5^{30}
- [ ] E) 5^3

---

37 Write 1.5×10^3 as an ordinary number.

- [ ] A) 150
- [ ] B) 1001.5
- [ ] C) 0.0015
- [ ] D) 1,500
- [ ] E) 150,000

---

38 Chloe thinks of a number, multiplies it by 4, then adds 7. The answer is 39. What number did Chloe think of?

- [ ] A) 7
- [ ] B) 128
- [ ] C) -8
- [ ] D) 9
- [ ] E) 8

© Revision Library | revisionlibrary.co.uk

39 Work out the value of 10^{-2}, as a fraction.

- [ ] A) 1/100
- [ ] B) -100
- [ ] C) 100
- [ ] D) -20
- [ ] E) 1/1000

---

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

- [ ] A) 1.5×10^{-2}
- [ ] B) 1.5×10^{-15}
- [ ] C) 1.5×10^{-1}
- [ ] D) 1.5×10^{0}
- [ ] E) 15×10^{-2}

---

41 Chloe thinks of a number, multiplies it by 9, then adds 4. The answer is 31. What number did Chloe think of?

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

---

42 Simplify $3y^{7} \times 5y^{3}$.

- [ ] A) $15y^{21}$
- [ ] B) $15y^{10}$
- [ ] C) $8y^{10}$
- [ ] D) $8y^{21}$
- [ ] E) $15y^{11}$

© Revision Library | revisionlibrary.co.uk

43 Write 8,340 in standard form.

- ☐ A) 8.34×10^3
- ☐ B) 83.4×10^2
- ☐ C) 0.834×10^4
- ☐ D) 8.34×10^2
- ☐ E) 8.34×10^4

---

44 Oliver thinks of a number, multiplies it by 4, then subtracts 4. The answer is 20. What number did Oliver think of?

- ☐ A) 4
- ☐ B) 9
- ☐ C) 96
- ☐ D) 6
- ☐ E) 5

---

45 Write $5^4 \times 5^3$ as a single power of 5.

- ☐ A) 5^6
- ☐ B) 5^1
- ☐ C) 5^7
- ☐ D) 5^{14}
- ☐ E) 5^8

---

46 Lucy thinks of a number, multiplies it by 8, then adds 1. The answer is 33. What number did Lucy think of?

- ☐ A) 256
- ☐ B) 3
- ☐ C) 4
- ☐ D) 5
- ☐ E) -4

© Revision Library | revisionlibrary.co.uk

47 Simplify $16a^4x^6 \div 4ax$.

- ☐ A) $4a^3x^5$
- ☐ B) $12a^3x^5$
- ☐ C) $4a^4x^5$
- ☐ D) $4a^5x^7$
- ☐ E) $4a^3x^6$

---

48 y is inversely proportional to x. When x = 4, y = 15.

(a) Find the value of k in the formula y = k/x. **(2)**

(b) Find the value of x when y = 24. **(2)**

---

49 Write 5.1×10^{-6} as an ordinary number.

- ☐ A) 0.000000051
- ☐ B) 0.00051
- ☐ C) 0.00000051
- ☐ D) 0.000051
- ☐ E) 0.0000051

---

50 Isla thinks of a number, multiplies it by 7, then adds 6. The answer is 90. What number did Isla think of?

- ☐ A) 588
- ☐ B) 12
- ☐ C) -12
- ☐ D) 11
- ☐ E) 13

© Revision Library | revisionlibrary.co.uk

51 Simplify $7y^5 \times 3y^5$.

- ☐ A) $21y^9$
- ☐ B) $10y^{10}$
- ☐ C) $10y^{25}$
- ☐ D) $21y^{11}$
- ☐ E) $21y^{10}$

---

52 Two friends, Zainab and Callum, invest money in a small business in the ratio 4:7. After one year, the profit is shared between them in the same ratio as their investment. Zainab receives £150 less than Callum.

(a) Using x for one share, write expressions for Zainab's and Callum's amounts of profit. **(1)**

(b) Form an equation using the given difference, and solve it to find the value of x. **(2)**

(c) Find the total profit shared between them. **(2)**

.....

(d) The following year, the profit totals £880 and is shared in the same ratio, 4:7. Calculate Callum's share of this profit. **(2)**

.....

© Revision Library | revisionlibrary.co.uk

Mark scheme · 2.16 Number, Ratio and Algebra Depth: 1-hour Pack

Question 1

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

Answer: E) 7

Question 2

C cao ($27y^{12}$); raise the number and multiply the powers **B1**

Answer: C) $27y^{12}$

Question 3

E cao (0.000313); move the decimal point **B1**

Answer: E) 0.000313

Question 4

D cao (1/1000); a negative power means the reciprocal **B1**

Answer: D) 1/1000

Question 5

B cao (9.5×10^3); move the decimal point to give a number from 1 to 10 **B1**

Answer: B) 9.5×10^3

Question 6

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

Answer: C) 14

Question 7

A cao (9^6); multiply the powers **B1**

Answer: A) 9^6

Question 8

B cao (7,800); move the decimal point **B1**

Answer: B) 7,800

Question 9

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

Answer: C) 11

Question 10

D cao (9^{12}); multiply the powers **B1**

Answer: D) 9^{12}

Question 11

E cao (0.254); move the decimal point **B1**

Answer: E) 0.254

Question 12

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

Answer: C) 10

Question 13

B cao ($256b^{16}$); raise the number and multiply the powers **B1**

Answer: B) $256b^{16}$

Question 14

D cao (6.3×10^{-4}); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: D) 6.3×10^{-4}

Question 15

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

Answer: A) 11

Question 16

E cao ($3b^5x^2$); divide the numbers, subtract the powers **B1**

Answer: E) $3b^5x^2$

Question 17

A cao (2.7×10^{-10}); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: A) 2.7×10^{-10}

Question 18

C cao (1/64); a negative power means the reciprocal **B1**

Answer: C) 1/64

Question 19

E cao (4×10^9); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: E) 4×10^9

Question 20

B cao (x = 5); form an equation, then solve it **B1**

Answer: B) x = 5

Question 21

C cao ($24x^8$); multiply the numbers, add the powers **B1**

Answer: C) $24x^8$

Question 22

E cao (5.92×10^5); move the decimal point to give a number from 1 to 10 **B1**

Answer: E) 5.92×10^5

Question 23

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

Answer: B) 12

Question 24

D cao (8^{25}); multiply the powers **B1**

Answer: D) 8^{25}

Question 25

A cao (0.00705); move the decimal point **B1**

Answer: A) 0.00705

Question 26

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

Answer: D) 10

Question 27

C cao (1/5); a negative power means the reciprocal **B1**

Answer: C) 1/5

© Revision Library | revisionlibrary.co.uk

Question 28

E cao (3.25×10^1); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: E) 3.25×10^1

Question 29

(a) $45/3^2 = 45/9$ oe **M1**

(a) k = 5 cao **A1**

(a) Answer: k = 5

(b) substitutes x = 6 into $E = 5x^2$, ft from part a **M1**

(b) 180 J cao **A1**

(b) Answer: 180 J

Question 30

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

Answer: A) 9

Question 31

B cao ($30p^{11}$); multiply the numbers, add the powers **B1**

Answer: B) $30p^{11}$

Question 32

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

Answer: A) 2

Question 33

D cao ($35b^7$); multiply the numbers, add the powers **B1**

Answer: D) $35b^7$

Question 34

E cao (9,700); move the decimal point **B1**

Answer: E) 9,700

Question 35

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

Answer: C) 13

Question 36

B cao (5^{15}); add the powers **B1**

Answer: B) 5^{15}

Question 37

D cao (1,500); move the decimal point **B1**

Answer: D) 1,500

Question 38

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

Answer: E) 8

Question 39

A cao (1/100); a negative power means the reciprocal **B1**

Answer: A) 1/100

Question 40

C cao (1.5×10^{-1}); combine the numbers and the powers of ten, then tidy to standard form **B1**

Answer: C) 1.5×10^{-1}

Question 41

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

Answer: E) 3

Question 42

B cao ($15y^{10}$); multiply the numbers, add the powers **B1**

Answer: B) $15y^{10}$

Question 43

A cao (8.34×10^3); move the decimal point to give a number from 1 to 10 **B1**

Answer: A) 8.34×10^3

Question 44

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

Answer: D) 6

Question 45

C cao (5^7); add the powers **B1**

Answer: C) 5^7

Question 46

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

Answer: C) 4

Question 47

A cao ($4a^3x^5$); divide the numbers, subtract the powers **B1**

Answer: A) $4a^3x^5$

Question 48

(a) 4 x 15 = 60 oe **M1**

(a) k = 60 cao **A1**

(a) Answer: k = 60

(b) 60/24, ft from part a **M1**

(b) x = 2.5 cao **A1**

(b) Answer: x = 2.5

Question 49

E cao (0.0000051); move the decimal point **B1**

Answer: E) 0.0000051

Question 50

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

Answer: B) 12

Question 51

E cao ($21y^{10}$); multiply the numbers, add the powers **B1**

Answer: E) $21y^{10}$

© Revision Library | revisionlibrary.co.uk

Question 52

(a) Zainab = 4x and Callum = 7x, both required, oe **B1**

(a) Answer: Zainab = 4x, Callum = 7x

(b) 7x - 4x = 150 oe (correct equation formed) **M1**

(b) x = 50 cao **A1**

(b) Answer: x = 50

(c) total = 4x + 7x = 11x oe, ft from part b **M1**

(c) £550 cao **A1**

(c) Answer: £550

(d) one share = 880/11 = 80 oe **M1**

(d) £560 cao **A1**

(d) Answer: £560

© Revision Library | revisionlibrary.co.uk