UNIT 1 *Indices* Revision Test 1.1

40 minutes are allowed. DO NOT use a calculator.

1. Evaluate:

   (a) $(8 \times 8) - 24$ (b) $(27 + 33) \div 6$

   (c) $(48 \div 8) \times (45 \div 3)$ (d) $(72 - 24) \div 4$

   (4 marks)

2. Find the values of:

   (a) 3^2 (b) 4^3 (c) $\sqrt{64}$

   (d) $\sqrt[3]{125}$ (e) $\sqrt[3]{27}$ (f) $3^2 - 2^3$

   (g) $\sqrt{4} + \sqrt{9}$ (h) $\sqrt{16} \times \sqrt{25}$ (i) $3^2 + 4^2 - 5^2$

   (9 marks)

3. Simplify the following expressions, leaving your answer in index notation.

   (a) $4^3 \times 4^2$ (b) $\left(2^3 \times 2^4\right) \div 2^7$

   (c) $\left(3^2 \times 3^3\right) \div \left(3 \times 3^2\right)$ (d) $10^{10} \div \left(10^2 \times 10^3 \times 10^4\right)$

   (7 marks)

4. Express each of the following numbers as a number to a power.

   (a) 8 (b) 125 (c) 1000 *(3 marks)*

5. Find the missing numbers.

   (a) $\left(2^3\right)^3 = 2^{?}$ (b) $\left(4^2\right)^{?} = 4^8$ *(2 marks)*

6. Simplify the following expressions.

   (a) $a^6 \div a^2$ (b) $\left(x^4 \div x^2\right)^2$

   (c) $\left(x^2 \times x^4\right) \div \left(x \times x^5\right)$ (d) $\dfrac{\left(b^2 \times b^3\right)^3}{b^{10}}$ *(7 marks)*

7. List all the factors of 42. *(2 marks)*

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8. Express each of the following numbers as products of prime numbers.

   (a) 200 (b) 140 *(4 marks)*

9. Find the highest common factor (HCF) of the following pairs of numbers:

   (a) 80 and 140 (b) 144 and 96 *(2 marks)*

10. Which of these numbers:

    5, 10, 15, 20, 25, 30, 35, 40

    (a) is a multiple of six? *(1 mark)*
    (b) is a square number? *(1 mark)*
    (c) is a prime number? *(1 mark)*

    (SEG)

11. Choose one of these words:

    prime, factor, square, multiple, cube

    to complete each of the following sentences about the number sequence

    4, 8, 12, 16, 20, 24, 28

    (a) Each number is a . . . . . of 4. *(1 mark)*
    (b) The numbers 4 and 16 are . . . . . numbers. *(1 mark)*
    (c) Each of the numbers 4 and 8 is a . . . . . of 16. *(1 mark)*

    (LON)

12. A bingo card has the following numbers.

			35		
9		27			51
				47	
	15				60

    (a) Which one of these numbers is a multiple of 17? *(1 mark)*
    (b) Which one of these numbers is prime? *(1 mark)*
    (c) Express the number 60 as a product of its prime factors. *(2 marks)*

    (SEG)

Revision Test 1.1 Answers

One mark for each answer unless stated otherwise.

1. (a) 40 (b) 10 (c) 90 (d) 12 B1 B1 B1 B1 *(4 marks)*

2. (a) 9 (b) 6 (c) 8 (d) 5 (e) 3
   (f) 1 (g) 5 (h) 20 (i) 0 B1 for each *(9 marks)*

3. (a) 4^5 (b) $2^0\ (=1)$ (c) 3^2 (d) $10^1\ (=10)$ B1 B2 B2 B2 *(7 marks)*

4. (a) 2^3 (b) 5^3 (c) 10^3 B1 B1 B1 *(3 marks)*

5. (a) 9 (b) 4 B1 B1 *(2 marks)*

6. (a) a^4 (b) x^4 (c) 1 (d) b^5 B1 B2 B2 B2 *(7 marks)*

7. 1, 2, 3, 6, 7, 14, 21, 42 [B1 for all correct except 1 and 42] B2 *(2 marks)*

8. (a) $2^3 \times 5^2$ (b) $2^2 \times 5 \times 7$ B2 B2 *(4 marks)*

9. (a) 20 (b) 48 B1 B1 *(2 marks)*

10. (a) 30 (b) 25 (c) 5 B1 B1 B1 *(3 marks)*

11. (a) multiple (b) square (c) factor B1 B1 B1 *(3 marks)*

12. (a) 51 (b) 47 (c) $2^2 \times 3 \times 5$ B1 B1 B2 *(4 marks)*

(TOTAL MARKS 50)

UNIT 1 *Indices* **Revision Test 1.2**

40 minutes are allowed. DO NOT use a calculator in Questions 1–11.

1. Find the values of:

   (a) 4^3 (b) $\sqrt{64}$ (c) $\sqrt[3]{125}$

   (d) $\sqrt{4}+\sqrt{9}$ (e) $\sqrt{16}\times\sqrt{25}$ *(5 marks)*

2. Simplify the following expressions, leaving your answer in index notation.

   (a) $4^3\times 4^2$ (b) $\left(2^3\times 2^4\right)\div 2^7$

   (c) $\left(3^2\times 3^3\right)\div\left(3\times 3^2\right)$ (d) $10^{10}\div\left(10^2\times 10^3\times 10^4\right)$ *(7 marks)*

3. Express each of the following numbers as a number to a power.

   (a) 8 (b) 125 (c) 1000 *(3 marks)*

4. Find the missing numbers.

   (a) $\left(2^3\right)^3=2^{?}$ (b) $\left(4^2\right)^{?}=4^8$ *(2 marks)*

5. Simplify the following expressions.

   (a) $a^6\div a^2$ (b) $\left(x^4\div x^2\right)^2$

   (c) $\left(x^2\times x^4\right)\div\left(x\times x^5\right)$ (d) $\dfrac{\left(b^2\times b^3\right)^3}{b^{10}}$ *(7 marks)*

6. List all the factors of 42. *(2 marks)*

7. Express the number 140 as a product of prime numbers. *(2 marks)*

8. Find the highest common factor (HCF) of 144 and 96. *(1 mark)*

9. Write the following numbers in standard form.

   (a) 2001 (b) 0.002 *(2 marks)*

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10. Express the following in ordinary notation.

(a) 4.23×10^2 (b) 5.2×10^{-3} *(3 marks)*

11. Evaluate the following, writing your answer in standard form.

$$\left(16.4 \times 10^{-3}\right) \div \left(0.82 \times 10^3\right)$$ *(2 marks)*

Use a calculator in Questions 12–15.

12. Evaluate the following, giving your answer in standard form.

$$\frac{\left(7 \times 10^4\right) + \left(6 \times 10^3\right)}{1.9 \times 10^{-3}}$$ *(2 marks)*

13. A number, n, expressed in terms of its prime factors, is $2^6 \times 3^4 \times 11$.

(a) Find the value of n. *(1 mark)*

(b) Express $8n$ as a product of prime factors. *(2 marks)*

(c) Find the value of $8n$, giving your answer in standard form. *(2 marks)*

(SEG)

14. The distance from the Earth to the Moon is 250 000 miles.

(a) Express this number in standard form. *(1 mark)*

The distance from the Earth to the Sun is 9.3×10^7 miles.

(b) Calculate the value of the expression

$$\frac{\text{distance from the Earth to the Moon}}{\text{distance from the Earth to the Sun}}$$

giving your answer in standard form. *(2 marks)*

(LON)

15. It is given that $p = 4 \times 10^{-2}$ and $q = 2 \times 10^{-3}$.

(a) Calculate the value of pq, giving your answer in standard form. *(2 marks)*

(b) Calculate the value of $p + q$. *(2 marks)*

(MEG)

Revision Test 1.2 Answers

1. (a) 64 (b) 8 (c) 5 (d) 5 (e) 20 B1 B1 B1 B1 B1 *(5 marks)*

2. (a) 4^5 (b) $2^0\ (=1)$ (c) 3^2 (d) $10^1\ (=10)$ B1 B2 B2 B2 *(7 marks)*

3. (a) 2^3 (b) 5^3 (c) 10^3 B1 B1 B1 *(3 marks)*

4. (a) 9 (b) 4 B1 B1 *(2 marks)*

5. (a) a^4 (b) x^4 (c) 1 (d) b^5 B1 B2 B2 B2 *(7 marks)*

6. 1, 2, 3, 6, 7, 14, 21, 42 [B1 if all correct except for 1 and 42] B2 *(2 marks)*

7. $2^2 \times 5 \times 7$ B2 *(2 marks)*

8. 48 B1 *(1 mark)*

9. (a) 2.001×10^3 (b) 2×10^{-3} B1 B1 *(2 marks)*

10. (a) 423 (b) 0.0052 B1 B2 *(3 marks)*

11. 2×10^{-5} B2 *(2 marks)*

12. 4×10^7 B2 *(2 marks)*

13. (a) $n = 57\ 024$ (b) $8n = 2^9 \times 3^4 \times 11$ B1 B2
    (c) 4.56192×10^5 M1 A1 *(5 marks)*

14. (a) 2.5×10^5 B1
    (b) 2.688×10^{-3} M1 A1 *(3 marks)*

15. (a) 8×10^{-5} M1 A1
    (b) 4.2×10^{-2} M1 A1 *(4 marks)*

(TOTAL MARKS 50)

UNIT 1 *Indices* Revision Test 1.3

40 minutes are allowed. DO NOT use a calculator in Questions 1–12.

1. Simplify the following expressions, leaving your answer in index notation.

   (a) $\left(2^3 \times 2^4\right) \div 2^7$ (b) $\left(3^2 \times 3^3\right) \div \left(3 \times 3^2\right)$ (c) $10^{10} \div \left(10^2 \times 10^3 \times 10^4\right)$

   (6 marks)

2. Express each of the following numbers as a number to a power.

   (a) 8 (b) 125 (c) 1000 *(3 marks)*

3. Find the missing numbers.

   (a) $\left(2^3\right)^3 = 2^{?}$ (b) $\left(4^2\right)^{?} = 4^8$ *(2 marks)*

4. Simplify the following expressions.

   (a) $\left(x^2 \times x^4\right) \div \left(x \times x^5\right)$ (b) $\dfrac{\left(b^2 \times b^3\right)^3}{b^{10}}$ *(4 marks)*

5. Express the number 140 as a product of prime numbers. *(2 marks)*

6. Find the highest common factor (HCF) of 144 and 96. *(1 mark)*

7. Find the value of each of the following:

   (a) $64^{\frac{1}{2}}$ (b) $125^{\frac{4}{3}}$ (c) 5^{-2} (d) $\left(\dfrac{1}{9}\right)^{-\frac{1}{2}}$ *(4 marks)*

8. Simplify the following:

   (a) $\left(a^3\right)^3 \div \left(a^4\right)^2$ (b) $a^5 \div \left(a^4 \times a^2\right)$ *(4 marks)*

9. Solve the following equations:

   (a) $2^x = 256$ (b) $9^x = \dfrac{1}{27}$ (c) $x^3 = \dfrac{1}{27}$

   (d) $8^x = \dfrac{1}{4}$ *(4 marks)*

10. Write the following numbers in standard form.

    (a) 2001 (b) 0.002 *(2 marks)*

Revision Test 1.3

11. Express the following in ordinary notation.

(a) 4.23×10^{2} (b) 5.2×10^{-3} *(3 marks)*

12. Evaluate the following, writing your answer in standard form.

$$\left(16.4 \times 10^{-3}\right) \div \left(0.82 \times 10^{3}\right)$$ *(2 marks)*

Use a calculator in Questions 13–16.

13. Evaluate the following, giving your answer in standard form.

$$\frac{\left(7 \times 10^{4}\right) + \left(6 \times 10^{3}\right)}{1.9 \times 10^{-3}}$$ *(2 marks)*

14. The distance from the Earth to the Moon is 250 000 miles.

(a) Express this number in standard form. *(1 mark)*

The distance from the Earth to the Sun is 9.3×10^{7} miles.

(b) Calculate the value of the expression

$$\frac{\text{distance from the Earth to the Moon}}{\text{distance from the Earth to the Sun}}$$

giving your answer in standard form. *(2 marks)*
(LON)

15. It is given that $p = 4 \times 10^{-2}$ and $q = 2 \times 10^{-3}$.

(a) Calculate the value of pq, giving your answer in standard form. *(2 marks)*

(b) Calculate the value of $p + q$. *(2 marks)*
(MEG)

16. A number, x, is such that $x^{\frac{1}{2}} = \frac{1}{5}$.

(a) Find the value of $x^{\frac{3}{2}}$. *(2 marks)*

(b) Find the value of x^{-1}. *(2 marks)*
(MEG)

Revision Test 1.3 Answers

One mark for each answer unless stated otherwise.

1. (a) $2^0\ (=1)$ (b) 3^2 (c) $10^1\ (=10)$ B2 B2 B2 *(6 marks)*

2. (a) 2^3 (b) 5^3 (c) 10^3 B1 B1 B1 *(3 marks)*

3. (a) 9 (b) 4 B1 B1 *(2 marks)*

4. (a) 1 (b) b^5 B2 B2 *(4 marks)*

5. $2^2 \times 5 \times 7$ B2 *(2 marks)*

6. 48 B1 *(1 mark)*

7. (a) 8 (b) 625 (c) $\frac{1}{25}$ (d) 3 B1 B1 B1 B1 *(4 marks)*

8. (a) a (b) $a^{-1} = \frac{1}{a}$ B2 B2 *(4 marks)*

9. (a) 8 (b) $-\frac{3}{2}$ (c) $\frac{1}{3}$ (d) $-\frac{2}{3}$ B1 B1 B1 B1 *(4 marks)*

10. (a) 2.001×10^3 (b) 2×10^{-3} B1 B1 *(2 marks)*

11. (a) 423 (b) 0.0052 B1 B2 *(3 marks)*

12. 2×10^{-5} B2 *(2 marks)*

13. 4×10^7 B2 *(2 marks)*

14. (a) 2.5×10^5 B1
    (b) 2.688×10^{-3} M1 A1 *(3 marks)*

15. (a) 8×10^{-5} M1 A1
    (b) 4.2×10^{-2} M1 A1 *(4 marks)*

17. (a) $\frac{1}{125} = 0.008$ (b) 25 B2 B2 *(4 marks)*

(TOTAL MARKS 50)