



$-(-5)^0 + 2 \times (-3)^0 - (-2)^0$   
 $-1 + 2 \times 1 - 1$   
 $-1 + 2 - 1$   
 $0$

ii)  $(5 \times 3)^0 - (3-2)^0 + (7-3)^0$   
 $1 - (1)^0 + 1$   
 $1 - 1 + 1$   
 $1$

iii)  $3 - (1)^2 - 1$   
 $3 - 1 - 1$   
 $1$

iv)  $(4 \times 2 \div 4) - (3^2 - 5^2)^0 - (-5)^0$   
 $(8 \div 4) - 1 - 1$   
 $2 - 1 - 1$   
 $0$

13. Which expression has a value of 0?  
 i)  $-(-5)^0 + 2 \times (-3)^0 - (-2)^0 = 0$   
 ii)  $(5 \times 3)^0 - (3-2)^0 + (4-3)^0 = 1$   
 iii)  $3 - (2-2)^2 - (-4)^0 = 1$   
 iv)  $(4 \times 2 \div 4) - (3^2 - 5^2)^0 - (-5)^0 = 0$   
 a. i, ii, and iv      b. ii and iii      c. i, iii, and iv      d. i and iv

14. Write the product of  $5^7 \times 5^4$  as a single power. "Keep the base, add the exponents."  
 a.  $5^7$       b.  $5^{12}$       c.  $10^7$       d.  $25^7$

15. Write the product of  $(-7)^7 \times (-7)^3$  as a single power.  
 a.  $(-7)^{10}$       b.  $(-14)^{10}$       c.  $49^{10}$       d.  $(-7)^{21}$

16. Write the quotient of  $\frac{6^{10}}{6^7}$  as a single power. "Keep the base, subtract the exponents."  
 a.  $6^3$       b.  $6^{13}$       c.  $6^2$       d. 2

17. Write the quotient of  $(-8)^{13} \div (-8)^7$  as a single power.  
 a. 3      b.  $(-8)^{20}$       c.  $(-8)^6$       d.  $(-8)^{10}$

18. Express  $\frac{(-5)^9 \times (-5)^4}{(-5)^3}$  as a single power.  $\rightarrow$   
 a.  $(-5)^3$       b.  $(-5)^{11}$       c.  $(-5)^{12}$       d.  $(-5)^{16}$

19. Evaluate  $(-7)^4 - (-7)^4 + (-7)^0$ . Anything to the zero power is 1.  
 a. 0      b. -7      c. 1      d. -1

20. Evaluate  $\frac{(5)^9 \times (5)^4}{(5)^{11}} = \frac{(5)^{13}}{(5)^{11}} = (5)^2 = 25$   
 a. 10      b. 4      c. 2      d. 25

21. Evaluate  $(-2)^3 \times (-2)^7 + (-2)^8$ .  $\rightarrow$

15. Write the product of  $(-7)^7 \times (-7)^3$  as a single power. *add the exponents*  
 a.  $(-7)^{10}$  b.  $(-14)^{10}$  c.  $49^{10}$  d.  $(-7)^{21}$

16. Write the quotient of  $\frac{6^{10}}{6^5}$  as a single power. *"Keep the base, subtract the exponents"*  
 a.  $6^5$  b.  $6^{15}$  c.  $6^2$  d. 2

17. Write the quotient of  $(-8)^{15} \div (-8)^5$  as a single power.  
 a. 3 b.  $(-8)^{20}$  c.  $(-8)^3$  d.  $(-8)^{10}$

18. Express  $\frac{(-5)^9 \times (-5)^6}{(-5)^3}$  as a single power.  $\rightarrow$   
 a.  $(-5)^3$  b.  $(-5)^{51}$  c.  $(-5)^{12}$  d.  $(-5)^{18}$

19. Evaluate:  $(-7)^6 \div (-7)^6 = (-7)^0$  *Anything to the zero power = 1*  
 a. 0 b. -7 c. 1 d. -1

20. Evaluate:  $\frac{(5)^8 \times (5)^5}{(5)^{12}} = \frac{(5)^{13}}{(5)^{12}} = (5)^1 = 5$   
 a. 10 b. 4 c. 2 d. 25

21. Evaluate:  $(-2)^5 \times (-2)^3 \div (-2)^0 \rightarrow$   
 a. -128 b. -256 c. 256 d. -32 768

22. Which expressions have positive values?  
 i)  $[(-5)^2]^7 = (-5)^{14} = +$   
 ii)  $[-(-5)^2]^7 = -(-5)^{14} = -$   
 iii)  $-(5^2)^7 = -$   
 iv)  $-[-(-5)^2]^7 = +$   
 a. ii and iv b. ii and iii c. i and ii d. i and iv

*Handwritten notes:*  
 #18:  $\frac{(-5)^{15}}{(-5)^3} = (-5)^{12}$   
 #21:  $\frac{(-2)^5 \times (-2)^3}{(-2)^0} = (-2)^8 = 256$

23. Which expressions have negative values?

i)  $[-(-3)^5]^{15} = -(-3)^{15} = +$   
 ii)  $(-3^5)^5 = -3^{25} = -$   
 iii)  $(-3)^{5^5} = (-3)^{15} = -$   
 iv)  $-[(-3)^5]^5 = +$

a. ii and iii      b. i and ii      c. i and iv      d. iii and iv

Short Answer

24. Which answers are positive?

i)  $(9)^3$  +  
 ii)  $(-7)^6$  +  
 iii)  $(-3)^7$  -  
 iv)  $(-6)^3$  -

25. Evaluate:  $\frac{5^3 \times (2+4)^2 \times 6(-9)^0}{(-4)^0 \times 6^3 \times (7-2)^2}$

26. Simplify, then evaluate.  
 $\frac{(-2)^6 \times (-2)^2}{(-2)^3 \times (-2)^0}$

27. Simplify, then evaluate.  
 $\frac{(2^4)^3 \times (2^2)^4}{(2^4 \times 2^4)^2}$

*Handwritten work for #25:*  
 Top: "100<sup>th</sup> Numerator"  
 $5^3 \times (2+4)^2 \times 6(-9)^0$   
 $5^3 \times (6)^2 \times 6(1)$   
 $125 \times 36 \times 6$   
 $27000$   
 Bottom: "Denominator"  
 $(-4)^0 \times 6^3 \times (7-2)^2$   
 $(1) \times 216 \times (5)^2$   
 $-1 \times 216 \times 25$   
 $-216 \times 25$   
 $5400$   
 $\frac{27000}{5400} = 5$

*Handwritten work for #26:*  
 $\frac{(-2)^8}{(-2)^3} = (-2)^5 = -32$

*Handwritten work for #27:*  
 $\frac{2^{12} \times 2^8}{(2^8)^2} = \frac{2^{20}}{2^{16}} = 2^4 = 16$

Short Answer

24. Which answers are positive?  
 i)  $(5)^3$  +  
 ii)  $(-7)^6$  +  
 iii)  $(-3)^7$  -  
 iv)  $(-6)^3$  -

25. Evaluate:  $\frac{5^3 \times (2+4)^2 \times 6(-9)^0}{(-4)^0 \times 6^3 \times (7-2)^2}$

26. Simplify, then evaluate.  
 $\frac{(-2)^6 \times (-2)^2}{(-2)^3 \times (-2)^0}$

27. Simplify, then evaluate.  
 $\frac{(2^4)^3 \times (2^2)^4}{(2^4 \times 2^4)^2}$

28. Simplify, then evaluate.  
 $(4^6 \div 4^2)^2 - (2^8 \div 2^6)^2$

29. Simplify, then evaluate.  
 $[(-2)^4 \times (-2)^3] - [(-3)^4 - (-3)^3]$

#25  
 Top "Numerator"  
 $5^3 \times (2+4)^2 \times 6(-9)^0$   
 $5^3 \times (6)^2 \times 6(1)$   
 $125 \times 36 \times 6$   
 $27000$

Bottom "Denominator"  
 $(-4)^0 \times 6^3 \times (7-2)^2$   
 $(1) \times 216 \times (5)^2$   
 $1 \times 216 \times 25$   
 $216 \times 25$   
 $5400$

$\frac{27000}{5400} = 5$

#26  
 $\frac{(-2)^9}{(-2)^3}$   
 $(-2)^5$   
 $-32$

#27  
 $\frac{2^{12} \times 2^8}{(2^3)^2}$   
 $\frac{2^{20}}{2^6}$   
 $2^4$   
 $16$

#28  
 $(4^6 \div 4^2)^2 - (2^8 \div 2^6)^2$   
 $(4^4)^2 - (2^2)^2$   
 $4^6 - 2^4$   
 $4096 - 16$   
 $4080$

Problem  
 Evaluate:  $\frac{(15)^2 - (6)^2}{(9)^2 - 2(3)^2}$  Show your calculations.  
 $\frac{225 - 36}{81 - 2(9)}$   
 $\frac{225 - 36}{81 - 18} = \frac{189}{63} = 3$

Powers: Unit 2  
 Helpful Hints for the Test:

Simplify - use exponent laws to make the question smaller

Evaluate - Calculate the answer

$(-3)^4$	$-3^2$	<p><u>Powers with the Same Base</u></p> <p>① <math>(3)^2 \times (3)^7</math>  <math>3^{2+7}</math>  <math>(3)^9</math></p> <p>→ when you multiply powers with the same base ADD exponents</p>	<p><u>Power of a Power</u></p> <p>Multiply exponents</p> <p><math>(3^2)^4</math>  <math>3^{2 \times 4}</math>  <math>3^8</math></p>
$(-3) \times (-3) \times (-3) \times (-3)$	$-3 \times 3 \times 3 \times 3 \times 3$		

---

<p>Product of Powers:</p> <p><math>(3 \times 7)^2</math>  <math>3^2 \times 7^2</math></p>	<p>Product of Quotients:</p> <p><math>(\frac{4}{7})^3 = \frac{4^3}{7^3}</math></p>	<p>② <math>\frac{4^7}{4^2} = 4^{7-2} = 4^5</math></p> <p>→ when you Divide powers with the same base, SUBTRACT Exponents</p>
---	--	--

---

<p>Write using a power of tens</p> <p>456  <math>(4 \times 10^2) + (5 \times 10^1) + (6 \times 10^0)</math></p>	<p><math>(3 \times 10^4) + (5 \times 10^3) + (2 \times 10^0)</math>  <math>30\,000 + 5\,000 + 2</math>  <math>35\,002</math></p>
---	--

---

Order of Operations: BEDMAS

①  $(2 \times 3)^2 + 10^8 \times 10^4 + 10^{10}$   
 $(6)^2 + 10^8 \times 10^4 + 10^{10}$   
 $(6)^2 + 10^{12} + 10^{10}$   
 $36 + 10^2$   
 $36 + 100$   
 $136$

Simplify → means use your exponent laws

$= \frac{2^6 \times 2^7}{2^{10}} + 7$

Product of Powers:  
 $(3 \times 7)^2$   
 $3^2 \times 7^2$

Product of Quotients:  
 $(\frac{4}{7})^3 = \frac{4^3}{7^3}$

When you multiply powers with the same base ADD exponents  
 $\frac{4^7}{4^2} = 4^{7-2} = 4^5$

When you Divide powers with the same base; SUBTRACT Exponents

Write using a power of tens  
 456  
 $(4 \times 10^2) + (5 \times 10^1) + (6 \times 10^0)$

$(3 \times 10^4) + (5 \times 10^3) + (2 \times 10^0)$   
 30 000 + 5 000 + 2  
 35 002

Order of Operations:  
 BEDMAS

①  $(2 \times 3)^2 + 10^8 \times 10^4 + 10^{10}$   
 $(6)^2 + 10^8 \times 10^4 + 10^{10}$   
 $(6)^2 + 10^{12} + 10^{20}$   
 $36 + 10^2$   
 $36 + 100$   
 136

②  $3 + 2 \times 4 \div 2^2 + (9 \times 3)$   
 $3 + 2 \times 4 \div 2^2 + 27$   
 $3 + 2 \times 4 \div 4 + 27$   
 $3 + 8 \div 4 + 27$   
 $3 + 2 + 27$

Simplify  $\rightarrow$  means use your exponent laws  
 $= \frac{2^5 \times 2^7}{2^{10}} + 7$   
 $= \frac{2^{12}}{2^{10}} + 7$   
 $= 2^2 + 7$   
 $= 4 + 7$   
 11

No more laws so now evaluate