Power Play

Standard difficulty · 20 questions · 40 marks · Time: 36 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. 3^{-3} is equal to:

(a) 27 **(b)** −27 **(c)** −1/27 **(d)** 1/27

2. $9^9 \times 9^5$ equals:

(a) 81^{14} **(b)** 9^4 **(c)** 9^{14} **(d)** 9^{45}

3. $(3^{-2})^{-4}$ equals:

(a) 3^2 **(b)** 3^{-6} **(c)** 3^8 **(d)** 9^8

4. $7^{-3} \div 7^3$ equals:

(a) 7^{-6} **(b)** 1^{-6} **(c)** 7^0 **(d)** 7^6

5. Any non-zero number raised to the power 0 equals:

(a) 0 **(b)** 1
(c) the number itself **(d)** −1

6. The standard form of 75,100,000 is:

(a) 751×10^5 **(b)** 7.51×10^8 **(c)** 7.51×10^6 **(d)** 7.51×10^7

7. The standard form of 0.00000305 is:

(a) 3.05×10^{-6} **(b)** 3.05×10^{-7} **(c)** 3.05×10^{10} **(d)** 3.05×10^{-5}

8. $(2/7)^{-2}$ equals:

(a) 49/4 **(b)** 14/5 **(c)** 4/49 **(d)** −49/4

Section B — Short answer — 8 × 2 = 16 marks

9. Find the value of $(3^{-1} + 8^{-1})^{-1}$.

10. Simplify: $(9^3 \times 9^{-7}) \div 9^9$

11. Find x if $9^4 \times 9^x = 9^8$.

12. Find the value of $(-4)^5$.

13. Write 5.88×10^7 in usual form.

14. Write 5.36×10^{-6} in usual form.

15. Which is larger: 8.35×10^9 or 3.6×10^5?

16. Find the value of $4^{-2} - 2^{-2}$.

Section C — Word problems — 4 × 4 = 16 marks

17. The distance from a planet to its moon is about 74,500,000,000 km. Write this number in standard form.

18. A red blood cell is about 0.000492 m across. Write this number in standard form.

19. One sheet of paper is 0.09 cm thick. How thick is a stack of 244 sheets? Give the answer in standard form.

20. A computer does 9×10^9 calculations in one second. How many calculations does it do in 47 seconds? Give the answer in standard form.

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Answer key

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Q	Answer	Working
1	**(d) 1/27**	$3^{-3} = 1/3^3 = 1/27$
2	**(c) 9^{14}**	add the powers: 9 + 5 = 14
3	**(c) 3^{8}**	multiply the powers: −2 × (−4) = 8
4	**(a) 7^{-6}**	subtract the powers: −3 − 3 = −6
5	**(b) 1**	e.g. $7^0 = 1$
6	**(d) 7.51×10^{7}**	move the decimal point to get a number from 1 to 10
7	**(a) 3.05×10^{-6}**	count the places the decimal point moves to the right
8	**(a) 49/4**	flip the fraction and make the power positive: $(7/2)^2$
9	**24/11**	1/3 + 1/8 = 11/24; its reciprocal is 24/11
10	**9^{-13}**	3 − 7 − 9 = −13
11	**x = 4**	4 + x = 8
12	**−1024**	5 is odd, so the answer is negative; $4^5 = 1024$
13	**58,800,000**	move the decimal point 7 places to the right
14	**0.00000536**	move the decimal point to the left
15	**8.35×10^{9}**	compare the powers of 10 first
16	**−3/16**	1/16 − 1/4 = −3/16
17	**7.45×10^{10}**	74,500,000,000 = 7.45×10^{10}
18	**4.92×10^{-4}**	0.000492 = 4.92×10^{-4}
19	**2.196×10^{1} cm**	0.09 × 244 = 21.96 = 2.196×10^{1}
20	**4.23×10^{11}**	9 × 47 = 423; 423 × 10^9 = 4.23×10^{11}

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