AChor/MPM1D **Name: ________________________**
Date: _________________________

Practice Test 2: Powers and Roots

K: _____	C: _____	A: _____	T: _____

Knowledge:

1. Write as a single power with positive exponent(s).

(a) $6^9 \times 6^2 \div 6^5$ [K: 2]

(b) $(-3)^0 \times (-3) \div (-3)^{-5}$ [K: 2]

(c) $((-11)^3)^{-1} \times ((-11)^2)^5$ [K: 3]

(d) $\dfrac{(9^2)^6 \times 9^{-3}}{(9)^{11}}$ [K: 4]

2. Simplify then evaluate.

(a) $5^{-2} - 25^{-1} - (5^{-1})^2$ [K: 5]

(b) $-2^2 + 2^{-1} + (2^2 \times 3^0)$ [K: 5]

3. Complete the following table. [K: 7]

Numeral	Scientific Notation
$1\,200$	(a)
(b)	2.34×10^{-6}
$0.000\,000\,054\,8$	(c)
$-1\,306\,000$	(d)
(e)	9.4×10^{11}
$-0.000\,007\,85$	(f)
(g)	1.754×10^{15}

4. Simplify as a scientific notation.

(a) $9.7\times10^{12}\times2.2\times10^{6}$ [K: 2]

(b) $\dfrac{-2.55\times10^{-22}}{3.4\times10^{-11}}$ [K: 2]

5. Simplify as a single power with positive exponent(s) then evaluate as a fraction.

(a) $-\left(\dfrac{1}{5}\right)^{2}$ [K: 3]

(b) $\left(-\dfrac{2}{3}\right)^{-4}$ [K: 3]

6. Simplify then evaluate. Give answers to 2 decimal places if necessary.

(a) $\sqrt{\sqrt{49}+\sqrt{81}}$ [K: 4]

(b) $\sqrt{8\times\sqrt{64}}$ [K: 3]

Communication:
Write answers for the following questions in full English sentences. [C: 1]

7. Explain in words the steps you will follow to simplify $2^4\times2^5$. [C: 2]

8. The Pythagorean relation: $c^2=a^2+b^2$.
Explain the relation and describe what each variable represents. [C: 4]

9. When asked to write 135000000 in scientific notation, Ali answered 135×10^6. Why is this answer wrong? What is the right answer? [C: 3]

Provide answer statements for the following sections where applicable. [C: 1]
Application:

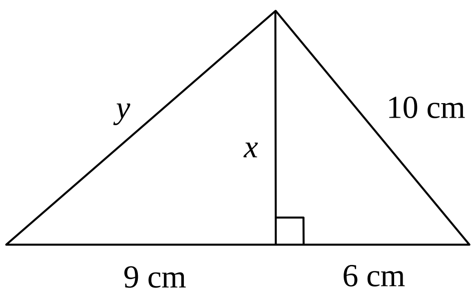
10. A rectangular tabletop is 10^4 cm long and 10 cm wide. What is its area? Write your answer as a single power. [A: 3]

11. The area of a square shaped parking lot is 1296 m².
    (a) How long is each side of the parking lot? [A: 3]

    (b) How much fencing would be needed to go around the whole parking lot? [A: 3]

12. A student drew a sketch on an 8-cm square piece of paper. If the sketch is mounted on a piece of poster board twice the area of the paper. What is the length of each side of the poster board, to the nearest tenth of a centimetre? [A: 5]

13. Find the length of the unknown sides, to 2 decimal places. [A: 6]



Thinking:

14. The mass of the Earth is about 6.0×10^{24} kg.
    (a) The mass of the sun is about 3.3×10^{5} times as great as the mass of Earth. What is the mass of the sun? [T: 4]

    (b) The mass of the sun is about 2.75×10^{7} times as great as the mass of the moon. What is the mass of the moon? [T: 4]

15. You want to bring a sheet of glass 2.4 m by 2.1 m through a doorway that is 2 m high and 1.6 m wide. Will it fit? Explain. Draw a well-labelled diagram to visualize the situation. [T: 6]

16. Use mathematical reasoning to determine each value of *n*.

(a) $(7^2)^n = 1$ [T: 2]

(b) $(n^2)^{-2} = \frac{1}{16}$ [T: 2]

17. "All integers have 2 square roots."
Do you agree with this statement? Explain your reasoning. [T: 4]

1. (a) 6^6**, (b)** $(-3)^6$**, (c)** $(-11)^7$**, (d)** $\frac{1}{9^2}$**; 2. (a)** $-\frac{1}{25}$**, (b)** $\frac{1}{2}$**; 3. (a)** 1.2×10^3**, (b)** $0.000\,002\,34$ **,(c)** 5.48×10^{-8}**, (d)** -1.306×10^6**, (e)** $940\,000\,000\,000$**, (f)** -7.85×10^{-6}**, (g)** $1\,754\,000\,000\,000\,000$**;**

4. (a) 2.134×10^{19}**, (b)** -7.5×10^{-12}**; 5. (a)** $-\frac{1}{25}$**,** -25**, (b)** $\left(-\frac{3}{2}\right)^4$**,** $\frac{81}{16}$**; 6. (a)** $\sqrt{16}$**,** 4**, (b)** $\sqrt{64}$**,** 8**;**

7. It is multiplying powers with the same base, so first write the common base as the base then add the exponents of the two powers. **8.** Check Worksheet 2-11; **9.** First part of the notation is not a decimal number greater than and equal to 1 and less than 10. The right answer should be 1.35×10^8; **10.** 10^5 cm^2 **; 11. (a)** 36 m**, (b)** 144 m**;**

12. 11.3 cm; **13.** $x = 8$ cm, $y = 12.04$ cm; **14. (a)** 1.98×10^{30} kg**, (b)** 7.2×10^{22} kg**; 15.** Yes, the glass sheet can go through the diagonal of the doorway. The diagonal of the doorway is 2.56 m long and it is greater than the length or the width of the glass sheet; **16. (a)** 0**, (b)** 2**; 17.** No, only positive integers have 2 square roots (positive and negative: $2\times2=4$ and $-2\times-2=4$ as well). Zero has only 1 square root because $0\times0=0$. Negative integers have no square root at all because the square root of a negative integer is undefined.