The following problems were created by the University of Waterloo's Centre for Education in Mathematics and Computing (CEMC). Visit cemc.uwaterloo.ca for more information and resources.

1) If $2^n = 8^{20}$, what is the value of n?
(A) 10 (B) 60 (C) 40 (D) 16 (E) 17

2) If $4^n = 64^2$, then n equals
(A) 3 (B) 5 (C) 6 (D) 8 (E) 12

3) If $512^x = 64^{240}$, then x equals
(A) 80 (B) 30 (C) 360 (D) 160 (E) 237

4) If $10^x \cdot 10^5 = 100^4$, what is the value of x?
(A) 1 (B) 35 (C) 11 (D) $\frac{4}{5}$ (E) 3

5) If x and y are positive integers with $3^x 5^y = 225$, then $x + y$ equals
(A) 7 (B) 4 (C) 5 (D) 3 (E) 8

6) If $\left(2^4\right)\left(3^6\right) = 9\left(6^x\right)$, what is the value of x?
(A) 2 (B) 3 (C) 4 (D) 216 (E) 8

ANSWERS AND SOURCES

1) B, 2020 Fermat (Grade 11), #8
2) C, 2013 Pascal (Grade 9), #15
3) D, 2013 Fermat (Grade 11), #13
4) E, 2014 Fermat (Grade 11), #12
5) B, 2015 Fermat (Grade 11), #8
6) C, 2006 Fermat (Grade 11), #12