F.BF.A.2: Sequences 1

1 The formula of the nth term of the sequence $3, -6, 12, -24, 48 \ldots$ is
   1) $a_n = -2(3)^n$ 3) $a_n = -2(3)^{n-1}$
   2) $a_n = 3(-2)^n$ 4) $a_n = 3(-2)^{n-1}$

2 In a geometric sequence, the first term is 4 and the common ratio is -3. The fifth term of this sequence is
   1) 324   3) -108
   2) 108   4) -324

3 The eleventh term of the sequence $3, -6, 12, -24, \ldots$, is
   1) -3072 3) 3072
   2) -6144 4) 6144

4 What is the fifteenth term of the sequence $5, -10, 20, -40, 80, \ldots$?
   1) $-163,840$ 3) 81,920
   2) $-81,920$ 4) 327,680

5 What is the fifteenth term of the geometric sequence $-\sqrt{5}, \sqrt{10}, -2\sqrt{5}, \ldots$?
   1) $-128\sqrt{5}$ 3) $-16384\sqrt{5}$
   2) $128\sqrt{10}$ 4) $16384\sqrt{10}$

6 The seventh term of the geometric sequence $\sqrt{6}, -2\sqrt{3}, 2\sqrt{6}, -4\sqrt{3} \ldots$ is
   1) $6\sqrt{6}$ 3) $8\sqrt{6}$
   2) $-6\sqrt{3}$ 4) $-8\sqrt{3}$

7 The eighth and tenth terms of a sequence are 64 and 100. If the sequence is either arithmetic or geometric, the ninth term can *not* be
   1) -82 3) 80
   2) -80 4) 82

8 When a ball bounces, the heights of consecutive bounces form a geometric sequence. The height of the first bounce is 121 centimeters and the height of the third bounce is 64 centimeters. To the *nearest centimeter*, what is the height of the fifth bounce?
   1) 25   3) 36
   2) 34   4) 42

9 Simon lost his library card and has an overdue library book. When the book was 5 days late, he owed $2.25 to replace his library card and pay the fine for the overdue book. When the book was 21 days late, he owed $6.25 to replace his library card and pay the fine for the overdue book. Suppose the total amount Simon owes when the book is n days late can be determined by an arithmetic sequence. Determine a formula for a_n, the nth term of this sequence. Use the formula to determine the amount of money, in dollars, Simon needs to pay when the book is 60 days late.

F.BF.A.2: Sequences 1
Answer Section

1 ANS: 4   REF: 011715a2

2 ANS: 1

$$a_5 = 4(-3)^{5-1} = 324$$

REF: 012317ai

3 ANS: 3

$$a_{11} = 3(-2)^{11-1} = 3072$$

REF: 012404ai

4 ANS: 3

$$a_n = 5(-2)^{n-1}$$

$$a_{15} = 5(-2)^{15-1} = 81,920$$

REF: 011105a2

5 ANS: 1

$$a_n = -\sqrt{5}(-\sqrt{2})^{n-1}$$

$$a_{15} = -\sqrt{5}(-\sqrt{2})^{15-1} = -\sqrt{5}(-\sqrt{2})^{14} = -\sqrt{5} \cdot 2^7 = -128\sqrt{5}$$

REF: 061109a2

6 ANS: 3

$$r = \frac{-2\sqrt{3}}{\sqrt{6}} = \frac{-2}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{-2\sqrt{2}}{2} = -\sqrt{2} \quad a_7 = \sqrt{6}(-\sqrt{2})^{7-1} = \sqrt{6}(-\sqrt{2})^6 = \sqrt{6} \cdot 2^3 = 8\sqrt{6}$$

REF: 012410aii

7 ANS: 1

$$d = 18; \ r = \pm\frac{5}{4}$$

REF: 011714aii

8 ANS: 2

$$121(b)^2 = 64 \quad 64\left(\frac{8}{11}\right)^2 \approx 34$$

$$b = \frac{8}{11}$$

REF: 011904aii

9 ANS:

$$\frac{6.25 - 2.25}{21 - 5} = \frac{4}{16} = \$.25 \text{ fine per day.} \quad 2.25 - 5(.25) = \$1 \text{ replacement fee.} \quad a_n = 1.25 + (n-1)(.25). \quad a_{60} = \$16$$

REF: 081734aii