

# Adv. Functions - Arithmetic Sequences WS

1.)  $7, 11, 15, 19, \dots$   
 $\begin{array}{c} \vee \quad \vee \quad \vee \\ 11-7 \quad 15-11 \quad 19-15 \\ =4 \quad =4 \quad =4 \end{array}$

Yes, arithmetic  
where  $d=4$   
 $a_5 = 19+4 = 23$   
 $a_6 = 23+4 = 27$   
 $a_7 = 27+4 = 31$   
 $a_8 = 31+4 = 35$

2.)  $3, 6, 9, 13, \dots$   
 $\begin{array}{c} \vee \quad \vee \quad \vee \\ 6-3 \quad 9-6 \quad 13-9 \\ =3 \quad =3 \quad =4 \end{array}$

No, not  
arithmetic  
where  $d=N/A$

3.)  $31, 23, 15, 7, \dots$   
 $\begin{array}{c} \vee \quad \vee \quad \vee \\ 23-31 \quad 15-23 \quad 7-15 \\ =-8 \quad =-8 \quad =-8 \end{array}$

Yes, arithmetic  
where  $d=-8$   
 $a_5 = 7-8 = -1$   
 $a_6 = -1-8 = -9$   
 $a_7 = -9-8 = -17$   
 $a_8 = -17-8 = -25$

4.)  $4, 1.7, -0.6, -2.9, \dots$   
 $\begin{array}{c} \vee \quad \vee \quad \vee \\ 1.7-4 \quad -0.6-1.7 \quad -2.9-0.6 \\ =-2.3 \quad =-2.3 \quad =-2.3 \end{array}$

Yes, arithmetic  
where  $d=-2.3$   
 $a_5 = 2.9-2.3 = 0.6$   
 $a_6 = 0.6-2.3 = -1.7$   
 $a_7 = -1.7-2.3 = -4$   
 $a_8 = -4-2.3 = -6.3$

5.)  $a_1=2, d=6, a_{12}=?$

$$a_{12} = 2 + (12-1) \cdot 6$$

$$a_{12} = 2 + (11) \cdot 6$$

$$a_{12} = 68$$

6.)  $a_1=-10, d=2, a_{28}=?$

$$a_{28} = -10 + (28-1) \cdot 2$$

$$a_{28} = -10 + (27) \cdot 2$$

$$a_{28} = 44$$

7.)  $a_1=23, d=-14, a_{33}=?$

$$a_{33} = 23 + (33-1) \cdot (-14)$$

$$a_{33} = 23 + (32) \cdot (-14)$$

$$a_{33} = -425$$

8.)  $a_1=-24, d=-5, a_{19}=?$

$$a_{19} = -24 + (19-1) \cdot (-5)$$

$$a_{19} = -24 + (18) \cdot (-5)$$

$$a_{19} = -114$$

9.)  $34, 38, 42, \dots, a_{31}=?$

$$d = 38-34 = 4 \quad a_1 = 34$$

$$a_{31} = 34 + (31-1) \cdot 4$$

$$a_{31} = 154$$

10.)  $27, 30, 33, \dots, a_{52}=?$

$$d = 30-27 = 3 \quad a_1 = 27$$

$$a_{52} = 27 + (52-1) \cdot 3$$

$$a_{52} = 180$$

11.)  $12, 5, -2, \dots, a_{65}=?$

$$d = 5-12 = -7 \quad a_1 = 12$$

$$a_{65} = 12 + (65-1) \cdot (-7)$$

$$a_{65} = -436$$

12.)  $4, 16, 28, \dots, a_{23}=?$

$$d = 16-4 = 12 \quad a_1 = 4$$

$$a_{23} = 4 + (23-1) \cdot 12$$

$$a_{23} = 268$$

$$13.) a_{46} = 203, d = 4, a_1 = ?$$

$$203 = a_1 + (46-1) \cdot 4$$

$$203 = a_1 + 180$$

$$\begin{array}{r} -180 \end{array}$$

$$\boxed{a_1 = 23}$$

$$14.) a_1 = 36, a_{52} = 597, d = ?$$

$$597 = 36 + (52-1) \cdot d$$

$$597 = 36 + 51d$$

$$\begin{array}{r} -36 \end{array}$$

$$\begin{array}{r} 561 = 51d \\ 51 \end{array}$$

$$\boxed{d = 11}$$

$$15.) -15, -3, 9, \dots, 417, n = ?$$

$$a_1 = -15, d = -3 - (-15) = 12, a_n = 417$$

$$417 = -15 + (n-1) \cdot 12$$

$$417 = -15 + 12n - 12$$

$$417 = 12n - 27$$

$$\begin{array}{r} +27 \end{array}$$

$$\begin{array}{r} 444 = 12n \\ 12 \end{array}$$

$$n = 37 \rightarrow \boxed{37^{\text{th}} \text{ term}}$$

$$16.) a_{18} = -105, d = -7, a_6 = ?$$

$$-105 = a_1 + (18-1) \cdot -7$$

$$-105 = a_1 - 119$$

$$\begin{array}{r} +119 \end{array}$$

$$a_1 = 14$$

$$a_6 = 14 + (6-1) \cdot -7$$

$$\boxed{a_6 = -21}$$

$$17.) a_1 = 5, a_{31} = 245, a_{11} = ?$$

$$245 = 5 + (31-1) \cdot d$$

$$245 = 5 + 30d$$

$$\begin{array}{r} -5 \end{array}$$

$$\begin{array}{r} 240 = 30d \\ 30 \end{array}$$

$$d = 8$$

$$a_{11} = 5 + (11-1) \cdot 8$$

$$\boxed{a_{11} = 85}$$

$$18.) 17, 14, 11, \dots, -50, n = ?$$

$$a_1 = 17, d = 14 - 17 = -3, a_n = -50$$

$$-50 = 17 + (n-1) \cdot -3$$

$$-50 = 17 - 3n + 3$$

$$-50 = 20 - 3n$$

$$\begin{array}{r} -20 \end{array}$$

$$\begin{array}{r} -70 = -3n \\ -3 \end{array}$$

$$n = 23.\bar{3} \text{ or } \frac{70}{3} \rightarrow$$

no,  $-50$  is not part of the given sequence.

"n" must be a positive whole # - it's positive but not whole!

$$19) 4, 9, 14, 19, \dots$$

$$\downarrow \quad \downarrow$$

$$a_1, d=9-4=5$$

$$a_n = 4 + (n-1) \cdot 5$$

$$a_n = 4 + 5n - 5$$

$$\boxed{a_n = 5n - 1}$$

$$20) -63, -46, -29, -12, \dots$$

$$\downarrow \quad \downarrow$$

$$a_1, d = -46 - (-63) = 17$$

$$a_n = -63 + (n-1) \cdot 17$$

$$a_n = -63 + 17n - 17$$

$$\boxed{a_n = 17n - 80}$$

$$21) 7, -4, -15, -26, \dots$$

$$\downarrow \quad \downarrow$$

$$a_1, d = -4 - 7 = -11$$

$$a_n = 7 + (n-1) \cdot (-11)$$

$$a_n = 7 - 11n + 11$$

$$\boxed{a_n = -11n + 18}$$

$$\text{or } a_n = 18 - 11n$$

$$22) 6, \overset{a_2}{?}, \overset{a_3}{?}, \overset{a_4}{?}, 38$$

$$\downarrow \quad \downarrow \quad \downarrow \quad \downarrow$$

$$a_1, +8, +8, +8, +8, a_5$$

$$a_2 = 6 + 8 = 14$$

$$a_3 = 14 + 8 = 22$$

$$a_4 = 22 + 8 = 30$$

$$a_5 = 30 + 8 = 38 \checkmark$$

$$38 = 6 + (5-1) \cdot d$$

$$38 = 6 + 4d$$

$$\underline{-6} \quad \underline{-6}$$

$$\frac{32}{4} = \frac{4d}{4}$$

$$d = 8$$

$$23) 63, \overset{a_2}{?}, \overset{a_3}{?}, \overset{a_4}{?}, 147$$

$$\downarrow \quad \downarrow \quad \downarrow \quad \downarrow$$

$$a_1, +21, +21, +21, +21, a_5$$

$$a_2 = 63 + 21 = 84$$

$$a_3 = 84 + 21 = 105$$

$$a_4 = 105 + 21 = 126$$

$$a_5 = 126 + 21 = 147 \checkmark$$

$$147 = 63 + (5-1) \cdot d$$

$$147 = 63 + 4d$$

$$\underline{-63} \quad \underline{-63}$$

$$\frac{84}{4} = \frac{4d}{4}$$

$$d = 21$$

$$24) 16, \overset{a_2}{?}, \overset{a_3}{?}, \overset{a_4}{?}, -8$$

$$\downarrow \quad \downarrow \quad \downarrow \quad \downarrow$$

$$a_1, -6, -6, -6, -6, a_5$$

$$a_2 = 16 - 6 = 10$$

$$a_3 = 10 - 6 = 4$$

$$a_4 = 4 - 6 = -2$$

$$a_5 = -2 - 6 = -8 \checkmark$$

$$-8 = 16 + (5-1) \cdot d$$

$$-8 = 16 + 4d$$

$$\underline{-16} \quad \underline{-16}$$

$$\frac{-24}{4} = \frac{4d}{4}$$

$$d = -6$$