

Principles of Mathematics 12

Sample Questions

Answer Key

Cognitive Processes

K = Knowledge

U = Understanding

H = Higher Mental Processes

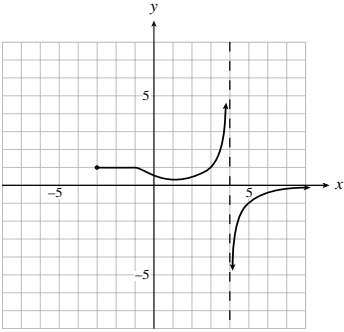
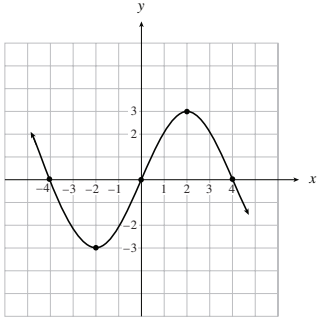
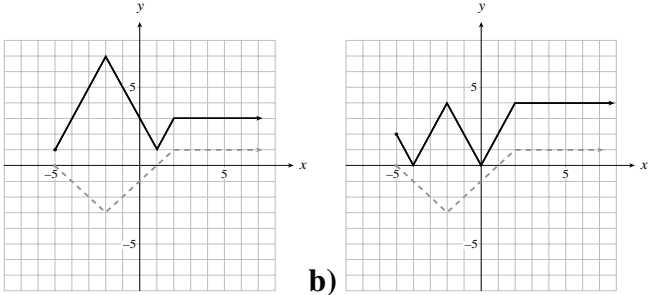
Topics	Prescribed Learning Outcomes (PLOs)	
1. Patterns and Relations	A	A1–A3: Geometric Sequences and Series A4–A6, A13–15: Logarithms and Exponents A7–A12, A16–A18: Trigonometry
2. Shape and Space	B	B1–B6: Transformations
3. Statistics and Probability	C	C1–C5: Combinatorics C5–C10: Probability

Question Number	Cognitive Process	Topic	PLO	Keyed Response
1.	K	1	A1	B
2.	U	1	A1	C
3.	U	1	A1	D
4.	H	1	A1	C
5.	U	1	A1	$n = 7$
6.	H	1	A1	3, 12, 48
7.	K	1	A2	B
8.	U	1	A2	D
9.	H	1	A2	C
10.	H	1	A2	C
11.	U	1	A2	Maximum of 511 Students
12.	U	1	A3	A
13.	H	1	A3	B
14.	H	1	A3	D
15.	H	1	A3	a) 0.648 m b) 19.30 m c) 20 m
16.	U	1	A3	D
17.	U	1	A4	D
18.	H	1	A4	B
19.	K	1	A5	B
20.	H	1	A5	C
21.	H	1	A5	$x \approx -2.96$
22.	U	1	A5	C

Question Number	Cognitive Process	Topic	PLO	Keyed Response
23.	U	1	A5	C
24.	H	1	A5	C
25.	U	1	A5	$x = 6$
26.	U	1	A6	B
27.	U	1	A6	B
28.	U	1	A6	B
29.	H	1	A6	B
30.	H	1	A6	B
31.	H	1	A6	A
32.	H	1	A5, A6	C
33.	K	1	A13	B
34.	K	1	A13	B
35.	U	1	A13	A
36.	U	1	A14	D
37.	U	1	A14	D
38.	U	1	A14	$t = 23.44$ weeks
39.	U	1	A14	If 20% of the radioactivity decays, then 80% remains. $80 = 100 \left(\frac{1}{2} \right)^{\frac{30}{n}}$ $0.80 = \left(\frac{1}{2} \right)^{\frac{30}{n}}$ $\log 0.80 = \frac{30}{n} \log \frac{1}{2}$ $n = \frac{30 \log \frac{1}{2}}{\log 0.80}$ $n \approx 93.19 \text{ hours}$
40.	U	1	A14	$x \approx 21.12$ m

41. H 1 A14 $30(1+0.014)^n = 80(1-0.017)^n$
 $30(1.014)^n = 80(0.983)^n$
 $\log 30 + n \log(1.014) = \log 80 + n \log(0.983)$
 $n(\log(1.014) - \log(0.983)) = \log 80 - \log 30$
 $n = \frac{\log 80 - \log 30}{\log(1.014) - \log(0.983)}$
 $n \approx 31.59$ years
42. U 1 A15 A
43. U 1 A15 D
44. U 1 A15 A
45. H 1 A15 C
46. H 1 A15 D
47. U 1 A7 D
48. U 1 A7 C
49. H 1 A7 C
50. U 1 A8 A
51. U 1 A8 A
52. U 1 A8 B
53. U 1 A9 B
54. U 1 A9 A
55. U 1 A9 A
56. H 1 A9 D
57. H 1 A9 C
58. H 1 A9 $x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{3\pi}{6}$
59. U 1 A9 $x = 0, -\frac{\pi}{6}$ or $\frac{\pi}{6}$
60. H 1 A9, A10 **a) $x = \pi$ b) $x = \pi + 6\pi n, x = 2\pi + 6\pi n$,**
where n is an integer
61. U 1 A10 B
62. U 1 A10 $x = \frac{\pi}{2} + n\pi$ or $x = 2n\pi$, where n is an integer
63. U 1 A10 $x = 0.26 + \frac{2n\pi}{3}, 0.79 + \frac{2n\pi}{3}$, where n is an integer

Question Number	Cognitive Process	Topic	PLO	Keyed Response
64.	U	1	A10	$x = 0.73 + 2\pi n$ or $x = \frac{7\pi}{6} + 2\pi n$, where n is an integer, $x = 2.41 + 2\pi n$ or $x = \frac{11\pi}{6} + 2\pi n$, where n is an integer
65.	H	1	A10	$x = \frac{\pi}{2} + \pi n$ or $x = \frac{\pi}{4} + \pi n$, where n is an integer
66.	U	1	A11	D
67.	U	1	A11	D
68.	U	1	A11	B
69.	H	1	A11	proof
70.	H	1	A11	proof
71.	U	1	A12	A
72.	U	1	A12	A
73.	U	1	A12	D
74.	H	1	A12	proof
75.	K	1	A16	D
76.	U	1	A16	C
77.	H	1	A16	A
78.	K	1	A17	C
79.	U	1	A17	A
80.	U	1	A17	D
81.	U	1	A17	C
82.	U	1	A17	C
83.	H	1	A17	B
84.	U	1	A17	A
85.	H	1	A17	B
86.	U	1	A18	D
87.	H	1	A18	B
88.	H	1	A18	a) $h = -30 \cos \frac{\pi}{24}t + 32$ b) $t = 13.54$ seconds
89.	H	1	A18	$h = -30 \cos \frac{2\pi}{1.6}t + 50$
90.	K	2	B1	D
91.	U	2	B1	C
92.	U	2	B1	A
93.	K	2	B2	D
94.	H	2	B2, B3	B

Question Number	Cognitive Process	Topic	PLO	Keyed Response
95.	K	2	B3	B
96.	K	2	B3	B
97.	U	2	B3	A
98.	U	2	B3	A
99.	H	2	B3	B
100.	U	2	B3	B
101.	K	2	B4	B
102.	H	2	B4	C
103.	U	2	B4	B
104.	U	2	B4	
				
105.	U	2	B5	C
106.	U	2	B5	C
107.	K	2	B6	C
108.	U	2	B6	D
109.	U	2	B6	
				
110.	H	2	B6	C
111.	H	2	B6	B
112.	U	2	B6	
				

Question Number	Cognitive Process	Topic	PLO	Keyed Response
113.	K	3	C1	D
114.	U	3	C1	C
115.	U	3	C1	C
116.	U	3	C2	B
117.	U	3	C2	C
118.	U	3	C2	B
119.	U	3	C2	D
120.	H	3	C2	B
121.	U	3	C2	$n = 6$
122.	U/H	3	C2	a) $\frac{9!}{2!3!4!} = 1260$ b) $9! = 362\,880$ c) $7!3! = 30\,240$ d) $3!2!3!4! = 1728$
123.	U/H	3	C2	a) $\frac{8!}{3!2!} = 3360$ b) $\frac{7!}{3!} = 840$ c) $\frac{6!}{3!} = 120$ d) <i>Case 1:</i> begins with A <i>Case 2:</i> begins with E $\frac{7!}{3!} = 840$ $\frac{7!}{2!3!} = 420$ $840 + 420 = 1260$
124.	U	3	C3	A
125.	K	3	C4	C
126.	U	3	C4	D
127.	H	3	C4	B
128.	U	3	C4	a) 150 ways b) 325 different ways
129.	K	3	C5	C
130.	U	3	C5	B
131.	U	3	C5	B
132.	U	3	C5	A
133.	U	3	C5	≈ 0.9185
134.	U (a–c) H (d)	3	C5	a) 0.0317 b) 0.2581 c) 0.6488 d) 0.0143
135.	U	3	C6	A
136.	H	3	C6, C9	B
137.	K	3	C7	A
138.	U	3	C8	D
139.	U	3	C8	A
140.	U	3	C8	C

Question Number	Cognitive Process	Topic	PLO	Keyed Response
141.	U/H	3	C8	0.58
142.	U/H	3	C8	a) $\frac{2}{19}$ b) $\frac{4}{19}$ c) $\frac{8}{19}$ d) $\frac{11}{19}$
143.	U	3	C9	C
144.	H	3	C9	C
145.	U	3	C9	0.3077
146.	U	3	C9	0.2732
147.	U	3	C9	a) $\frac{2}{7}$ b) $\frac{2}{6}$
148.	U	3	C9	a) 0.0315 b) 0.3731
149.	U/H	3	C9	a) $\frac{11}{24}$ b) $\frac{3}{11}$
150.	U	3	C10	C
151.	U	3	C10	B
152.	U	3	C10	D
153.	U	3	C10	C