



4. If a tennis ball is lobbed into the air with upward velocity of 14 meters per second, its velocity (V) and height (H) will be functions of time in flight described by the following rules.

$$V = 14 - 9.8T$$

$$H = 1 + 14T - 4.9T^2$$

H= \_\_\_\_\_ T= \_\_\_\_\_ a. Find the maximum height of that tennis ball and the time it takes to reach the height.

\_\_\_\_\_ b. What is the velocity of the ball at its maximum height?

\_\_\_\_\_ c. Find when the ball will hit the ground. Round your answer to the nearest **tenth** of a second.

\_\_\_\_\_ d. What is the velocity of the ball when it hits the ground?

5. Solve the following by using symbol manipulation or the quadratic formula. Show work!

\_\_\_\_\_ a.  $3x + 5 = -16 - 5x$

\_\_\_\_\_ b.  $5(x - 4) = 4x + 10$

\_\_\_\_\_ c.  $-6 = x^2 + 5x$

6. Write in shorter form. Simplify completely.

\_\_\_\_\_ a.  $9x + 4y - 2x + 3(y + 2)$

\_\_\_\_\_ b.  $4(-2) + 6x - 3 + 2(x + 1)$

7. Write in expanded form.

\_\_\_\_\_ a)  $(x + 2)(x - 7)$

\_\_\_\_\_ b.  $(x - 3)^2$

\_\_\_\_\_ c)  $4x(x + 2)$

8. Write in factored form.

\_\_\_\_\_ a)  $3x^2 - 12x$

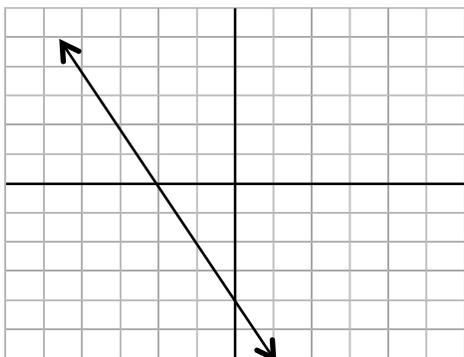
\_\_\_\_\_ b)  $-5x - 25$

9. Find the equation of a line given the following information: Show work!

\_\_\_\_\_ a. the line contains the points (10, 7) and (-5, 1)

\_\_\_\_\_ b. The line contains the point (-4, 8) and has slope 0.5.

10. Use the graph of a linear equation to answer the following.



\_\_\_\_\_ a. What is the slope of the line?

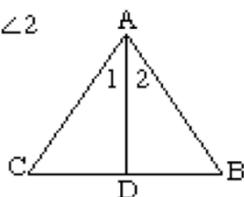
\_\_\_\_\_ b. What is the y-intercept?

\_\_\_\_\_ c. Write the equation of the line.

11. Write two column proofs

a.

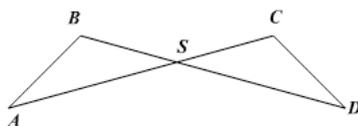
GIVEN:  $\angle ADB \cong \angle ADC$ ;  $\angle 1 \cong \angle 2$   
 PROVE:  $\triangle ABD \cong \triangle ACD$



b.

Given:  $\overline{AS} \cong \overline{DS}$ ;  $\overline{BS} \cong \overline{CS}$

Prove:  $\angle A \cong \angle D$



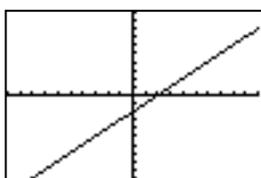
Circle the correct answer for the following multiple-choice questions.

12. Solve the inequality  $-2x + 3 < 11$ .
- (A)  $x < -4$
  - (B)  $x < 4$
  - (C)  $x > -4$
  - (D)  $x > 4$
13. Which of the following is equal to  $n^{-4} \cdot n^4$ ?
- (A) 0
  - (B) 1
  - (C)  $n$
  - (D)  $n^{-16}$
14. Which of the following is equal to  $(x^2y)^3$ ?
- (A)  $x^2y^3$
  - (B)  $x^5y^3$
  - (C)  $x^5y^4$
  - (D)  $x^6y^3$
15. Which of the following is equivalent to  $(5a^2b^{-3}c^{-4})^2$  if it is expressed using positive exponents?
- (A)  $\frac{25a^4}{b^6c^8}$
  - (B)  $\frac{5a^4}{b^6c^8}$
  - (C)  $\frac{25a^4}{b^9c^{16}}$
  - (D)  $\frac{10a^2}{bc^2}$
16. Which of the following equations is the same as  $y = 54 - 8(x + 3)$ ?
- A.  $y = 51 - 8x$
  - B.  $y = 30 - 8x$
  - C.  $y = 78 - 8x$
  - D.  $y = 57 - 8x$
  - E.  $y = 30 - x$
17. Which of the following is a solution of this equation  $x^2 + x - 6 = 6 + 2x$ ?
- A.  $x = -5$
  - B.  $x = -3$
  - C.  $x = 0$
  - D.  $x = 3$
  - E.  $x = 5$

18. Which of the following is a solution of this equation:  $45 = 34 + 4x$  ?
- A.  $x = 19.25$
  - B.  $x = 44$
  - C.  $x = 2.75$
  - D.  $x = -19.25$
  - E.  $x = -2.75$

19. Which of the following is a solution of this inequality:  $5x - 2 < 3x + 8$  ?
- A.  $x > 5$
  - B.  $x < 5$
  - C.  $x < 1.25$
  - D.  $x > 1.25$
  - E.  $x < 3$

20. Which of the following tables goes with this graph?



**A.**

X	Y1	
2	0	
4	6	
6	12	
8	18	
10	24	
12	30	
14	36	
16	42	
18	48	
20	54	
22	60	
24	66	
26	72	
28	78	
30	84	
32	90	
34	96	
36	102	
38	108	
40	114	
42	120	
44	126	
46	132	
48	138	
50	144	
52	150	
54	156	
56	162	
58	168	
60	174	
62	180	
64	186	
66	192	
68	198	
70	204	
72	210	
74	216	
76	222	
78	228	
80	234	
82	240	
84	246	
86	252	
88	258	
90	264	
92	270	
94	276	
96	282	
98	288	
100	294	
102	300	
104	306	
106	312	
108	318	
110	324	
112	330	
114	336	
116	342	
118	348	
120	354	
122	360	
124	366	
126	372	
128	378	
130	384	
132	390	
134	396	
136	402	
138	408	
140	414	
142	420	
144	426	
146	432	
148	438	
150	444	
152	450	
154	456	
156	462	
158	468	
160	474	
162	480	
164	486	
166	492	
168	498	
170	504	
172	510	
174	516	
176	522	
178	528	
180	534	
182	540	
184	546	
186	552	
188	558	
190	564	
192	570	
194	576	
196	582	
198	588	
200	594	
202	600	
204	606	
206	612	
208	618	
210	624	
212	630	
214	636	
216	642	
218	648	
220	654	
222	660	
224	666	
226	672	
228	678	
230	684	
232	690	
234	696	
236	702	
238	708	
240	714	
242	720	
244	726	
246	732	
248	738	
250	744	
252	750	
254	756	
256	762	
258	768	
260	774	
262	780	
264	786	
266	792	
268	798	
270	804	
272	810	
274	816	
276	822	
278	828	
280	834	
282	840	
284	846	
286	852	
288	858	
290	864	
292	870	
294	876	
296	882	
298	888	
300	894	
302	900	
304	906	
306	912	
308	918	
310	924	
312	930	
314	936	
316	942	
318	948	
320	954	
322	960	
324	966	
326	972	
328	978	
330	984	
332	990	
334	996	
336	1002	
338	1008	
340	1014	
342	1020	
344	1026	
346	1032	
348	1038	
350	1044	
352	1050	
354	1056	
356	1062	
358	1068	
360	1074	
362	1080	
364	1086	
366	1092	
368	1098	
370	1104	
372	1110	
374	1116	
376	1122	
378	1128	
380	1134	
382	1140	
384	1146	
386	1152	
388	1158	
390	1164	
392	1170	
394	1176	
396	1182	
398	1188	
400	1194	
402	1200	
404	1206	
406	1212	
408	1218	
410	1224	
412	1230	
414	1236	
416	1242	
418	1248	
420	1254	
422	1260	
424	1266	
426	1272	
428	1278	
430	1284	
432	1290	
434	1296	
436	1302	
438	1308	
440	1314	
442	1320	
444	1326	
446	1332	
448	1338	
450	1344	
452	1350	
454	1356	
456	1362	
458	1368	
460	1374	
462	1380	
464	1386	
466	1392	
468	1398	
470	1404	
472	1410	
474	1416	
476	1422	
478	1428	
480	1434	
482	1440	
484	1446	
486	1452	
488	1458	
490	1464	
492	1470	
494	1476	
496	1482	
498	1488	
500	1494	
502	1500	
504	1506	
506	1512	
508	1518	
510	1524	
512	1530	
514	1536	
516	1542	
518	1548	
520	1554	
522	1560	
524	1566	
526	1572	
528	1578	
530	1584	
532	1590	
534	1596	
536	1602	
538	1608	
540	1614	
542	1620	
544	1626	
546	1632	
548	1638	
550	1644	
552	1650	
554	1656	
556	1662	
558	1668	
560	1674	
562	1680	
564	1686	
566	1692	
568	1698	
570	1704	
572	1710	
574	1716	
576	1722	
578	1728	
580	1734	
582	1740	
584	1746	
586	1752	
588	1758	
590	1764	
592	1770	
594	1776	
596	1782	
598	1788	
600	1794	
602	1800	
604	1806	
606	1812	
608	1818	
610	1824	
612	1830	
614	1836	
616	1842	
618	1848	
620	1854	
622	1860	
624	1866	
626	1872	
628	1878	
630	1884	
632	1890	
634	1896	
636	1902	
638	1908	
640	1914	
642	1920	
644	1926	
646	1932	
648	1938	
650	1944	
652	1950	
654	1956	
656	1962	
658	1968	
660	1974	
662	1980	
664	1986	
666	1992	
668	1998	
670	2004	
672	2010	
674	2016	
676	2022	
678	2028	
680	2034	
682	2040	
684	2046	
686	2052	
688	2058	
690	2064	
692	2070	
694	2076	
696	2082	
698	2088	
700	2094	
702	2100	
704	2106	
706	2112	
708	2118	
710	2124	
712	2130	
714	2136	
716	2142	
718	2148	
720	2154	
722	2160	
724	2166	
726	2172	
728	2178	
730	2184	
732	2190	
734	2196	
736	2202	
738	2208	
740	2214	
742	2220	
744	2226	
746	2232	
748	2238	
750	2244	
752	2250	
754	2256	
756	2262	
758	2268	
760	2274	
762	2280	
764	2286	
766	2292	
768	2298	
770	2304	
772	2310	
774	2316	
776	2322	
778	2328	
780	2334	
782	2340	
784	2346	
786	2352	
788	2358	
790	2364	
792	2370	
794	2376	
796	2382	
798	2388	
800	2394	
802	2400	
804	2406	
806	2412	
808	2418	
810	2424	
812	2430	
814	2436	
816	2442	
818	2448	
820	2454	
822	2460	
824	2466	
826	2472	
828	2478	
830	2484	
832	2490	
834	2496	
836	2502	
838	2508	
840	2514	
842	2520	
844	2526	
846	2532	
848	2538	
850	2544	
852	2550	
854	2556	
856	2562	
858	2568	
860	2574	
862	2580	
864	2586	
866	2592	
868	2598	
870	2604	
872	2610	
874	2616	
876	2622	
878	2628	
880	2634	
882	2640	
884	2646	
886	2652	
888	2658	
890	2664	
892	2670	
894	2676	
896	2682	
898	2688	
900	2694	
902	2700	
904	2706	
906	2712	
908	2718	
910	2724	
912	2730	
914	2736	
916	2742	
918	2748	
920	2754	
922	2760	
924	2766	
926	2772	
928	2778	

23. Mr. Stein surveyed students in his two ninth-grade English classes. He asked if they had read the book *To Kill a Mockingbird* or if they had seen the movie. The survey results are summarized in the table at the right. Suppose that you randomly pick one of these students.

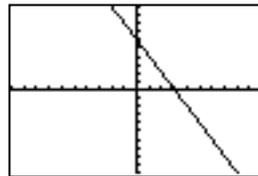
- a. What is the probability that the student has read the book?
- b. What is the probability that the student has read the book and seen the movie?
- c. What is the probability that the student has read the book or seen the movie? Show work.

	Saw Movie	Did Not See Movie	Total
Read Book	23	15	38
Did Not Read Book	12	10	22
Total	35	25	60

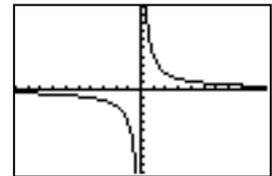
24. Match the equations with the appropriate calculator screen. Write the letter of the matching equation next to the screen.

- \_\_\_\_\_ I.
- \_\_\_\_\_ II.
- \_\_\_\_\_ III.
- \_\_\_\_\_ IV.

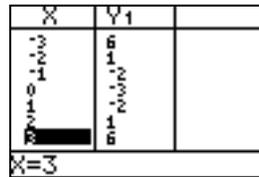
- |                       |
|-----------------------|
| a. $y = 2x - 6$       |
| b. $y = x^2 + 8$      |
| c. $y = \frac{4}{x}$  |
| d. $y = 6 - 2x$       |
| e. $y = x^2 - 3$      |
| f. $y = 6 + x$        |
| g. $y = -\frac{4}{x}$ |



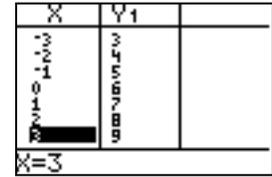
I.



II.



III.



IV.

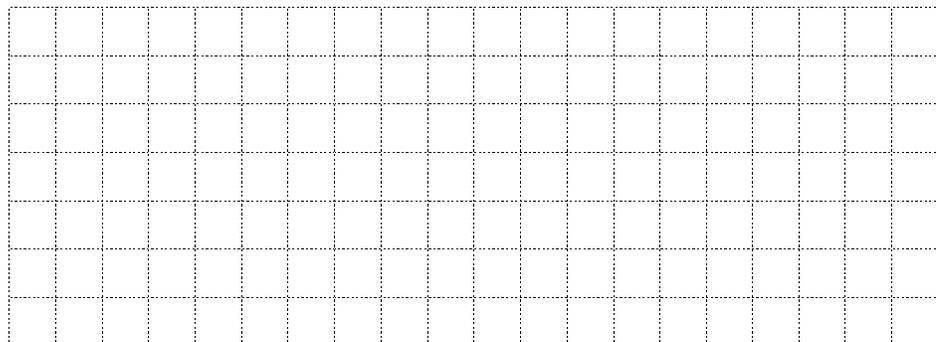
25. Draw the following space-shapes.  
a. Pentagonal Pyramid

b. Cylinder

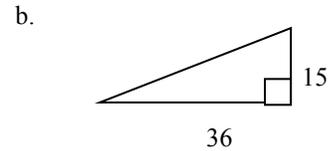
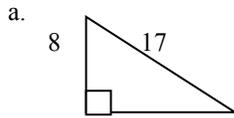
c. Kite Prism

26. Draw a cube with a plane of symmetry.

27. Draw the three views (top, front, right) for the following space-shape.



28. Find the missing sides in these right triangles.



29. Draw a regular hexagon and all of its lines showing reflection symmetry.

30. At the end of a daily television game show, the contestant who has won the most money is given a chance to win a grand prize. The grand prize is placed randomly behind one of three doors. A substantial cash prize is placed behind a second door and a “clunker” behind the third. The contestant chooses one of the doors and wins the prize that is behind it.

a. Explain how you can use a table of random digits to simulate the door a contestant chooses on this game show.

b. Describe a simulation model that uses your calculator’s random integer generator to estimate the mean number of shows needed for someone to win a grand prize. (On each show, the winning contestant has three equally likely doors to choose from.)

c. Run the simulation in Part b 10 times. Record the results in the table to the right, making new rows as needed.

d. From your 10 runs, compute the mean number of shows until someone wins the grand prize. Explain or show how you obtained your mean.

Number of Shows Needed to Win Grand Prize	Frequency
1	
2	
3	
4	
5	
6	
7	

31. Draw a regular pentagon and list all of its angles for *rotational* symmetry.

32. a . Find the total measure of all the angles in a regular octagon.

b. Find the measure of each angle as well.

33. What is translational symmetry? Describe and then draw an example.

34. Suppose 10 bacteria cells get into a cut on your leg. These cells triple every 20 minutes.

a. Make a chart showing the number of bacteria in your cut at 20 minute intervals for 2 hours.

b. Write a NOW-NEXT and  $y =$  equations for this situation.

35. A Jeep decreases in value by 15% each year. Assume someone bought a new Jeep in 2002 for a price of \$25,000.

a. Write NOW-NEXT and  $y =$  equations for the value of the Jeep that remains after each year.

b. Make a chart showing the value of the Jeep for each of the next 5 years.

Number of Years	Value of Jeep
0	\$25,000
1	
2	
3	
4	
5	

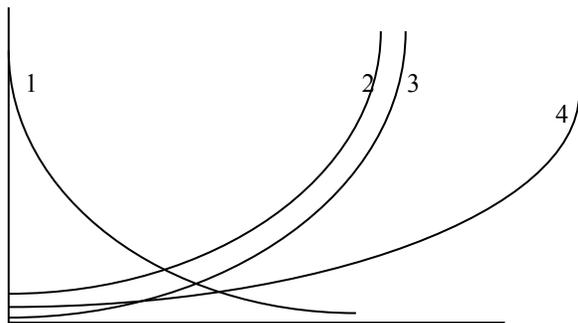
c. To the nearest tenth of a year, when will the value of the Jeep first be below \$5,000?

36. Brent starts an account with \$5,000 that earns 4% interest compounded annually.

a. Write NOW-NEXT and  $y=$  equations for this situation.

b. How long will it take the account to triple in value?

37.



Match the graph to its equation.

a.  $y = 4 (2)^x$  \_\_\_\_\_

b.  $y = 4 (5)^x$  \_\_\_\_\_

c.  $y = 6 (5)^x$  \_\_\_\_\_

d.  $y = 25 (.5)^x$  \_\_\_\_\_

38. a. Complete the following table so that the first row represents linear growth and the second row represents exponential growth.

X	0	1	2	3	4	5	6
Linear	4	12					
Exponential	4	12					

b. Write NOW-NEXT and  $y=$  equations for both the linear and exponential growth.

39. Use the laws of exponents and the relationship between exponential and radical expressions to rewrite the following expressions in an equivalent simpler form.

a.  $16^{\frac{1}{2}}$

b.  $\sqrt{\frac{9}{16}}$

c.  $4x^{-1}$

d.  $(2x^3)^3(4x^5)$

e.  $\sqrt{20}$

f.  $\frac{6x^3y^8}{2y^2}$

g.  $(4a^3b)(a^{-2}b^3)$

h.  $(3ab)^{-1}$

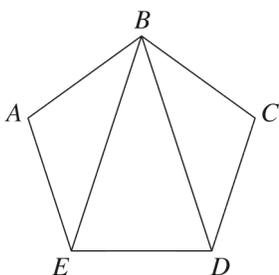
i.  $\frac{3a^4}{9a^5}$

j.  $\left(\frac{2}{3}\right)^{-3}$

k.  $\frac{6x^2yz^5}{14xy^4z^3}$

l.  $\frac{1}{g^{-2}}$

40. Polygon  $ABCDE$  below is a regular pentagon.



- Find the measure of  $\angle A$ .
- Identify two congruent triangles in the figure above. How do you know that they are congruent?
- We know an equilateral triangle, a regular hexagon, and a square are the only regular polygons that tile the plane. Explain why a regular pentagon  $ABCDE$  does not tile the plane?

41. Rewrite each of the following expressions in equivalent standard form  $ax^2 + bx + c$ .

a.  $2x(x - 7) + 15$

b.  $x(100 + 5x) + 2(x + 1) + 25$

c.  $(x - 3)(x + 9)$

d.  $(x + 7)(x + 2)$

e.  $(x - 7)^2$

f.  $(x - 8)(x + 8)$

42. Rewrite each expression in equivalent form as a product of two linear factors.

a.  $16x^2 + x$

b.  $5x^2 - 6x$

c.  $3x^2 + 12x$

43. Solve each equation by reasoning without the use of calculator graphs, tables, or symbol manipulation tools.

a.  $x^2 = 18$

b.  $5x^2 - 30 = 70$

c.  $8x^2 - 4x = 0$

d.  $8x + 6x^2 = 0$

e.  $x^2 + 10x + 20 = 0$

f.  $9x - 2x^2 = -5$