MA 152 PRACTICE QUESTIONS FOR THE FINAL

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1. $\frac{7}{16} = 16\overline{)7.0000} = 43.75\%$

2. $\left(\frac{2}{5} + \frac{1}{4}\right) \div \frac{1}{5}$

$\left(\frac{8}{20} + \frac{5}{20}\right) \div \frac{1}{5}$

$\frac{13}{20} \div \frac{1}{5}$

$\frac{13}{20} \cdot \frac{5}{1} = \frac{13}{4} \cdot \frac{1}{1} = \frac{13}{4}$

3. $m = \frac{3 - -2}{1 - 3} = \frac{3 + 2}{-2} = \frac{5}{-2} = -\frac{5}{2}$

4. $\left(\frac{1}{2}x - 5\right)^2$

$\left(\frac{1}{2}x - 5\right)\left(\frac{1}{2}x - 5\right)$

$\frac{1}{4}x^2 - \frac{5}{2}x - \frac{5}{2}x + 25$

$\frac{1}{4}x^2 - \frac{10}{2}x + 25$

$\frac{1}{4}x^2 - 5x + 25$

5. $3x - 5y = 4$

$-5y = -3x + 4$

$y = \frac{3}{5}x - \frac{4}{5}$

Since the slope = $\frac{3}{5}$,

the perpendicular slope = $-\frac{5}{3}$

6. $3x - 7 > 5x + 6$

$-2x - 7 > 6$

$-2x > 13$

$x < -\frac{13}{2}$

7. $y = \frac{k}{x}$ $\quad y = \frac{108}{x}$

$18 = \frac{k}{6}$ $\quad 2 = \frac{108}{x}$

$k = 108$ $\quad 2x = 108$

$x = 54$

8. $\left(\frac{a^2 b^{-3}}{a^{-3} b^2}\right)^{-2} = \frac{a^{-4} b^6}{a^6 b^{-4}} = \frac{b^{10}}{a^{10}} = \left(\frac{b}{a}\right)^{10}$

9. $\frac{(x-1)(x-1)}{(x-1)(x+1)} \cdot \frac{(x-2)}{(x-2)(x-1)}$

$\frac{\cancel{(x-1)}\cancel{(x-1)}}{\cancel{(x-1)}(x+1)} \cdot \frac{\cancel{(x-2)}}{\cancel{(x-2)}\cancel{(x-1)}}$

$\frac{1}{(x+1)}$

10. $x^3 + x^2 - ax^2 - ax$

$x(x^2 + x - ax - a)$

$x[\,(x^2 + x) + (-ax - a)\,]$

$x[\,x(x+1) - a(x+1)\,]$

$x(x-a)(x+1)$ These three are the factors

11. $12\sqrt{45} - 8\sqrt{80}$

$12\sqrt{9 \cdot 5} - 8\sqrt{16 \cdot 5}$

$36\sqrt{5} - 32\sqrt{5}$

$4\sqrt{5}$

12. $16x^2 - 4y^8$

$4(4x^2 - y^8)$

$4(2x - y^4)(2x + y^4)$

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13. $\begin{cases} 3x + y = -1 \\ x + 2y = 3 \end{cases}$

-2(3x + y)=-2(-1)

x + 2y = 3

-6x – 2y = 2

x + 2y = 3

-5x = 5

x = -1

14. $2x^2 - 3x = 2$

$2x^2 - 3x - 2 = 0$

(2x + 1)(x – 2) = 0

2x + 1 = 0 x – 2 = 0

2x = -1

$x = -\frac{1}{2}$ x = 2

answer: $-\frac{1}{2}, 2$

15. $\frac{1}{x-4} - \frac{1}{x-2} = \frac{1}{4}$

LCD: $4(x-4)(x-2)$

$\left(\frac{1}{x-4} - \frac{1}{x-2} = \frac{1}{4}\right)4(x-4)(x-2)$

4(x – 2) – 4(x – 4) = (x – 4)(x – 2)

$4x - 8 - 4x + 16 = x^2 - 2x - 4x + 8$

$8 = x^2 - 6x + 8$

$x^2 - 6x = 0$

x(x – 6) = 0

x = 0 x – 6 = 0

x = 6

answer: x = 0 and x = 6

16. $\frac{2}{\sqrt{x}-5} = \frac{2(\sqrt{x}+5)}{(\sqrt{x}-5)(\sqrt{x}+5)} = \frac{2(\sqrt{x}+5)}{x-25}$

17. $(3i-2)(2i-5) = 6i^2 - 15i - 4i + 10$

$= -6 - 19i + 10 = 4 - 19i$

18. Solve 2x – 3y = 7 for y to get it into the form y = mx + b where m = slope

2x – 3y = 7

-3y = -2x + 7

$y = \frac{2}{3}x - \frac{7}{3}$, the slope is $\frac{2}{3}$

The slope of the line parallel to 2x – 3y = 7 also has slope = $\frac{2}{3}$

$y - y_1 = m(x - x_1)$,

through point (2, -1) and m = $\frac{2}{3}$

$y - -1 = \frac{2}{3}(x - 2)$

$y + 1 = \frac{2}{3}x - \frac{4}{3}$

$y = \frac{2}{3}x - \frac{4}{3} - 1$

$y = \frac{2}{3}x - \frac{4}{3} - \frac{3}{3}$

$y = \frac{2}{3}x - \frac{7}{3}$

19. $2x^2 + 2x - 1 = 0$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x = \frac{-2 \pm \sqrt{4 - 4(2)(-1)}}{2(2)} = \frac{-2 \pm \sqrt{4+8}}{4}$

$x = \frac{-2 \pm \sqrt{12}}{4} = \frac{-2 \pm \sqrt{4 \cdot 3}}{4} = \frac{-2 \pm 2\sqrt{3}}{4}$

$x = \frac{2\left(-1 \pm \sqrt{3}\right)}{4} = \frac{-1 \pm \sqrt{3}}{2}$

$x = -\frac{1}{2} + \frac{1}{2}\sqrt{3}$ and $x = -\frac{1}{2} - \frac{1}{2}\sqrt{3}$

20. $\log\sqrt{\frac{z^3}{xy}} = \log\left(\frac{z^3}{xy}\right)^{\frac{1}{2}} = \frac{1}{2}\log\left(\frac{z^3}{xy}\right)$

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$\frac{1}{2}\left(\log z^3 - \log x - \log y\right)$

$\frac{1}{2}\left(3\log z - \log x - \log y\right)$

$\frac{3}{2}\log z - \frac{1}{2}\log x - \frac{1}{2}\log y$

21. $\left(\frac{1}{8}\right)^{-\frac{2}{3}} = 8^{\frac{2}{3}} = \left(\sqrt[3]{8}\right)^2 = 2^2 = 4$

22. $\log_a 7 - \log_a 20 + 2\log_a 4$

$\log_a 7 - \log_a 20 + \log_a 4^2$

$\log_a 7 - \log_a 20 + \log_a 16$

$\log_a \frac{7(16)}{20} = \log_a \frac{112}{20} = \log_a \frac{28}{5}$

23. $\log_2 \frac{1}{16} =$

$\log_2 \frac{1}{16} = x$

$2^x = \frac{1}{16}$

x = -4

$\log_2 \frac{1}{16} = -4$

$2^4 = 16$ therefore $2^{-4} = \frac{1}{16}$

24. $2^{x+1} = 3$

$\ln 2^{x+1} = \ln 3$

$(x + 1)\ln 2 = \ln 3$

$x + 1 = \frac{\ln 3}{\ln 2}$

x + 1 = 1.58496

x = 0.58496

x = 0.58

25. let x and y be the two numbers.

$x + y = \frac{3}{2}$

$x - y = \frac{1}{2}$

$2x = \frac{4}{2}$

$2x = 2$

x =1

$1 - y = \frac{1}{2}$

$y = \frac{1}{2}$

The smaller of the two is $\frac{1}{2}$

26.

	Present	Three years ago
Bob	25 + x	25 + x – 3 = 22 + x and 2(x –3)
Jane	x	x - 3

22 + x = 2(x – 3)

22 + x = 2x – 6

28 + x = 2x

28 = x

Jane is 28 years old at the present time.

27. Paul: 5 hours alone

Sally: 3 hours alone

Together: t hours

$\frac{1}{5} + \frac{1}{3} = \frac{1}{t}$

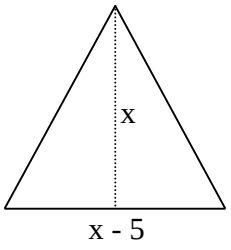
LCD is15t, therefore multiply both sides by 15t

3t + 5t = 15

8t = 15

$t = \frac{15}{8} = 1\frac{7}{8}$ hours

28. $A = \frac{1}{2}bh$



$$18 = \frac{1}{2}(x-5)(x)$$
$$36 = x^2 - 5x$$
$$x^2 - 5x - 36 = 0$$
$$(x-9)(x+4) = 0$$
$$x - 9 = 0 \text{ and } x + 4 = 0$$
$$x = 9 \text{ and } x = -4$$

Since we cannot have a negative length,
x = 9, and the base = 9 – 5 = 4 inches.

29.

	distance	rate	time
Car 1	D_1	r + 10	3
Car 2	D_2	r	3

Time = 3 hours since they left at
2:00 PM and meet at 5:00 PM
Since D = rt
$d_1 = 3(r + 10)$ and $d_2 = 3r$
Since the towns are 240 miles apart,
$d_1 + d_2 = 240$, therefore
$3(r + 10) + 3r = 240$
$3r + 30 + 3r = 240$
$6r + 30 = 240$
$6r = 210$
$r = 35$ and $r + 10 = 45$
The rate of the faster car is 45 mph

30. Let c = cost of the radio to the dealer
0.55c = the markup on the radio
c + 0.55c = the amount he sells the radio
c + 0.55c = 30.00
1.55c = 30.00
c = 19.35483871
Therefore, the radio sells for $19.35

31. I = Prt
P = Principle (Amount invested)
r = interest rate (As a decimal)
t = time (In years)
x = amount invested at 8%
4800 – x = amount invested at 9%

He invested part of the $4800 at 8% and the rest at 9%.

Since I = Prt,
x(.08)(1) = interest earned at 8%
(4800 – x)(.09)(1) = interest earned at 9%

412 = total interest earned
412 = x(.08)(1) + (4800 – x)(.09)(1)
412 = .08x + (.09)(4800 – x)
412 = .08x + 432 - .09x
-20 = -.01x
x = 2000

$2000 was invested at 8%
$2800 was invested at 9%

32. Remember that x is less than y.
Let the smaller number be x
y = x + 1

$(x + 1)^2 - x^2 = 145$
$x^2 + 2x + 1 - x^2 = 145$
$2x + 1 = 145$
$2x = 144$
$x = 72$

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33.

	distance	rate	time
Car	D_1	55	t
Truck	D_2	40	t + 1

The time for the truck is t + 1 since it has been on the road 1 hour longer than the car.

$D_1 = 55t$ and $D_2 = 40(t + 1)$

Since they travel the same distance, $D_1 = D_2$

$55t = 40(t + 1)$

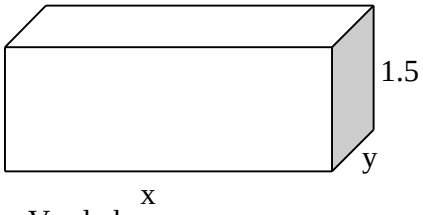
$55t = 40t + 40$

$15t = 40$

$t = 2\frac{2}{3}$ hours

$D_1 = 55\left(2\frac{2}{3}\right) = 146\frac{2}{3}$ miles

34.



$V = lwh$

$6 = xy(1.5)$

$4 = xy$

$y = \frac{4}{x}$

35. I = Prt, the total amount, A = P + Prt

$3480 = 2000 + 2000(r)(8)$

$1480 = 16000r$

$r = 0.0925$

$r = 9.25\%$

36. $F = P\left(1 + \frac{r}{m}\right)^{tm}$

$34000 = P\left(1 + \frac{.085}{12}\right)^{12(8)}$

$34000 = P(1.0070833)^{96}$

$34000 = P(1.969151910)$

$P = \$17,266.32$

37. $S_f = 425\left(\frac{\left(1 + \frac{.06}{4}\right)^{48} - 1}{\frac{.06}{4}}\right)$

$S_f = 425(69.565)$

$S_f = \$29,565.22$

38. $10000 = R\left(\frac{\left(1 + \frac{.076}{4}\right)^{20} - 1}{\frac{.076}{4}}\right)$

$10000 = R((24.056)$

$R = \$415.68$

39. The only point on the graph that is identified is (0, 2). Substitute 0 for x in each of the answer choices. A and D are the only choices that y = 2 when x = 0. This eliminates choices B, C and E.

By putting more values for x into the two equations, we can determine the answer.

$y = 2^x + 1$ $y = 2^{-x} + 1$

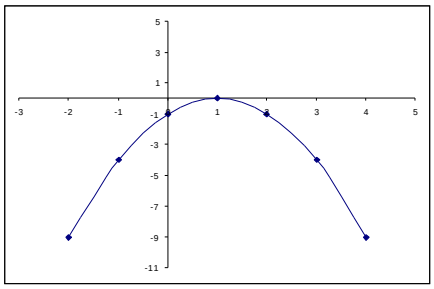
x	y		x	y
-2	1/4		-2	4
-1	1/2		-1	2
0	1		0	1
1	2		1	1/2
2	4		2	1/4

Notice the graph of $y = 2^{-x} + 1$ is going as x increases while the graph of $y = 2^x + 1$ is going up as x increases. The graph we are trying to match is going up as x increases. Therefore $y = 2^x + 1$ is the function we are looking for.

40. $y = -x^2 + 2x - 1$

Graph the function by putting points in for x a
and finding the corresponding values for y.

x	y
-2	-9
-1	-4
0	-1
1	0
2	-1
3	-4
4	-9



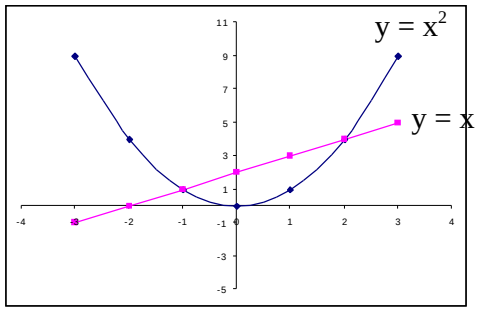
41. Graph $y = x^2$ and $y = x + 2$ and see where they intersect.

$y = x^2$

x	y
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9

$y = x + 2$

x	y
-3	-1
-2	0
-1	1
0	2
1	3
2	4
3	5



As you can see, they intersect in the first and second quadrants.