

MPM2D Final Exam Review June 2008

Formulas: I recommend that while completing this review, you create for yourself a formula sheet including all formulas you encounter and will need to **memorize**. You may not, of course, bring this in with you to the exam but creating this sheet will help you learn your formulas.

You may also find it helpful to create study sheets for each unit with relevant examples, formulae, etc.

Part A: Linear Systems

1. Identify the ordered pair that satisfies both equations.

a) $y = 3x + 2$ (0, -6) (-1, 0) (1, 5)
 $y = -x + 6$

b) $y = 2x$ (-1, -2) (-2, -4) (2, -8)
 $x + y = -6$

2. Solve using substitution.

a) $2x + y = 6$ b) $x - y = 1$ c) $y = 5 - 2x$ d) $3x + y = -9$
 $3x + 2y = 10$ $3x + y = 11$ $3x = 2y + 11$ $5x - 3y = -1$

3. Solve using elimination.

a) $x + 2y = 3$ b) $6x - 5y = -3$ c) $x - y = 6$ d) $2x - 5y = -1$
 $2x + 3y = -4$ $2y - 9x = -1$ $\frac{2x}{3} + \frac{y}{3} = 1$ $3x + 5y = -14$

For questions 4 - 7 below, remember to define variables, set up equations and solve.

4. The sum of two numbers is 255. When the smaller is subtracted from the larger, the result is 39. Find the numbers.
5. The Mackenzie, the longest river in Canada, is 1056km longer than the Yukon. The total length of the two rivers is 7426km. Find the length of each river.
6. Nick was counting quarters and dimes. He had 124 coins in all, totalling \$19.60. How many of each coin did he have?
7. Two cyclists start out at the same time, 288km apart and travel towards each other. If one cyclist travels 8km/h faster than the other and they meet in 4h, find the speed of each.

Part B: Co-ordinates and Geometry

1. The endpoints of a line segment are A(-4, 3) and B(5, -2). Calculate:

- a) the length of AB b) the midpoint of AB c) the slope of AB

2. Find the equations of the following lines.

- a) slope is $-\frac{1}{3}$ and passes through (6, 0)
b) passes through the points (-2, 5) and (-4, 11)
c) slope is 10, passes through (-1, 8)

3. Determine the equation of the following circles:

- a) centre (0,0) and radius 4 b) centre (0,0) and through (3,4)

4. Determine whether the following points are in, on, or outside the circle $x^2 + y^2 = 100$.

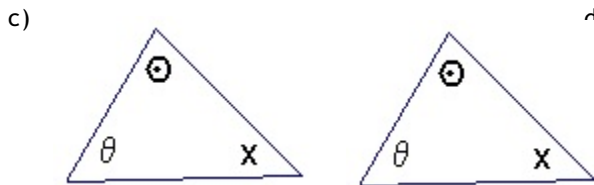
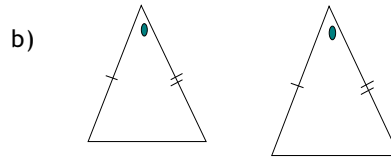
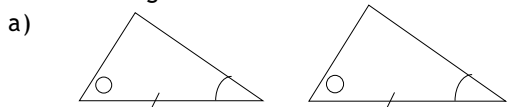
- a) (-6, 8) b) (10, 10) c) (1, -9)

Part B Continued

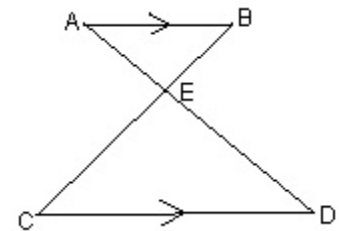
- $\triangle PQR$ has vertices $P(4, -3)$ $Q(-2, -7)$ and $R(-4, -4)$
 - Classify the triangle as scalene, isosceles or equilateral. Show all work.
 - Is triangle DEF a right-angled triangle? Prove your answer.
 - Calculate the perimeter of $\triangle PQR$, to the nearest tenth.
- Line segment AB has endpoints $A(3, -7)$ and $B(-9, -5)$. Find the equation of the perpendicular bisector of AB.
- Given $A(-1, 0)$ $B(2, 6)$ and $C(7, 3)$. Find the equation of the line through B and parallel to AC.
- Verify that the quadrilateral with vertices $K(-1,0)$ $L(1, -2)$ $M(4,1)$ and $N(2,3)$ is a rectangle. Remember to show all calculations of side lengths and slopes.
- Classify the quadrilateral with vertices $P(2,3)$ $Q(5, -1)$ $R(10, -1)$ and $S(7,3)$.

Part C: Trigonometry

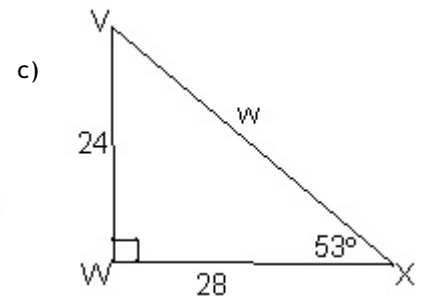
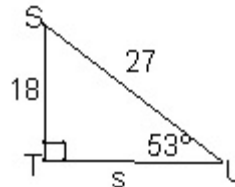
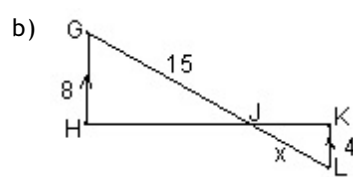
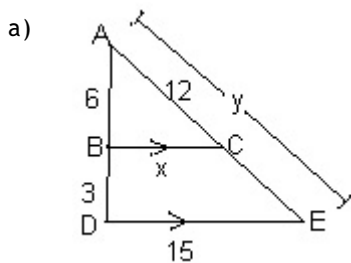
- State the conditions for two triangles to be congruent.
- In each pair of triangles below, state whether they are congruent. If they are, give the reason they are congruent.



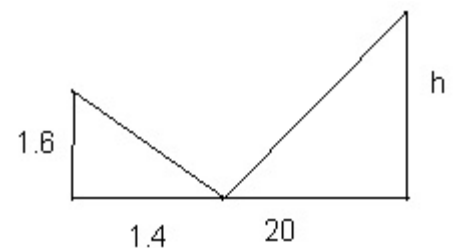
- State the conditions for two triangles to be similar.
- Prove that the triangles shown at right are similar.
 - Write the equivalent ratios of corresponding sides.



- For each of the following, find the unknown measure to one decimal place. Remember that you first have to prove that the triangles are similar!

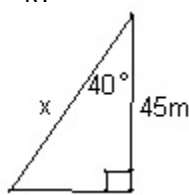
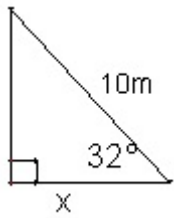


- To find the height of a tree, Holly places a mirror on the ground 20m from the base of the tree. She walks backward until she can see the top of the tree in the centre of the mirror. At that position, she is 1.4 m from the mirror and here eyes are 1.6m from the ground. Find the height of the tree.

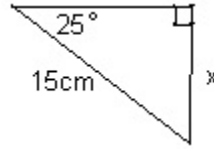


7. Find the length of the indicated side.

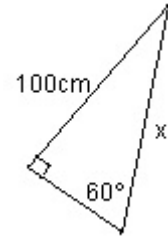
a)



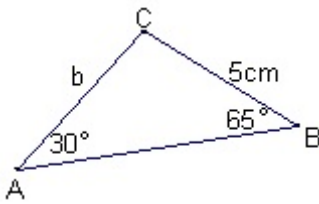
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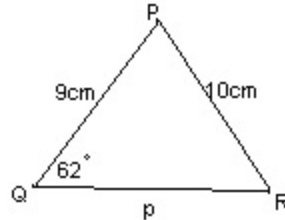
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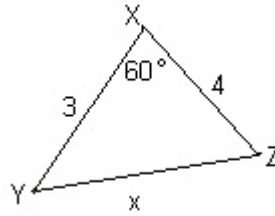
e)



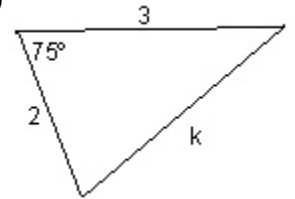
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g)

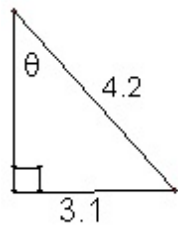


h)

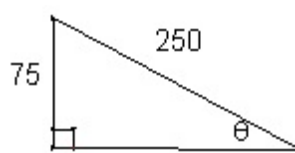


8. Solve for θ .

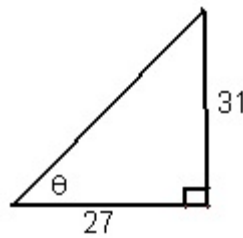
a)



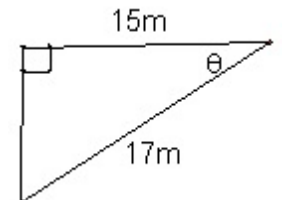
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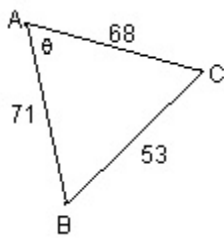
c)



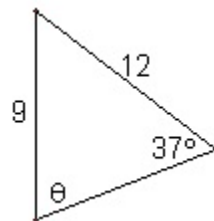
d)



e)



f)



9. A guy wire reaches 7m up a telephone pole. It makes an angle of 57° with the ground. How long is the wire?

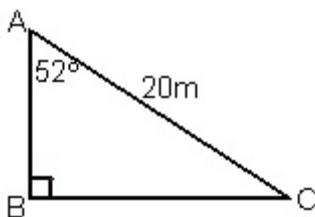
10. A plane climbs at an angle of 39° through a distance of 12 km. What altitude does it reach?

11. From a point A, the angle of elevation to the top of a tree is 58° . The distance from point A to the top of the tree is 90m. At point B, the angle of elevation to the top of the same tree is 75° . What is the distance between points A and B?

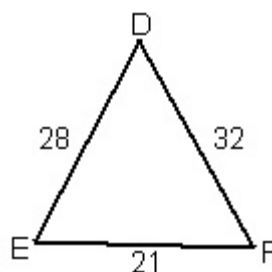
12. Three towns, A, B and C form a triangle. Towns A and B are 200km apart. $\angle CAB = 50^\circ$ and $\angle ABC = 64^\circ$. Determine the distance between town A and C and the distance between towns B and C.

13. Solve the following triangles.

a)



b)



Part D: Quadratics

- Expand and simplify the following.
 a) $(x + 5)(x - 2)$ b) $(m - 2)^2$ c) $3(x + 3)(x + 2)$ d) $-(a - 1)(a + 7)$
- Factor completely.
 a) $4m^2 - 28m$ b) $3ab - 9ab + 6a^2b$ c) $x^2 - 7x + 12$ d) $a^2 + 4a - 21$
 e) $y^2 + 9y + 20$ f) $t^2 - 6t - 27$ g) $x^2 + 6xy + 5y^2$ h) $m^2 - 9mn + 14n^2$
 i) $4t^2 - 28t + 40$ j) $1 - 36m^2$ k) $36t^2 - 49s^2$ l) $4t^2 - 4t + 1$
 m) $4m^2 + 20m + 25$ n) $9t - 4t^3$ o) $x^3 - 4x^2 + 4x$ p) $5y^4 + 10y^2 - 15$
 q) $x^2 - (3y+4)^2$ r) $y^4 - 81$
- Solve by factoring. Clearly state your solution.
 a) $x^2 + 4x = 0$ b) $k^2 - 36 = 0$ c) $p^2 + 4p - 12 = 0$ d) $12x^2 + 17x = 5$
- Solve using the quadratic formula. Round to 2 decimal places if necessary.
 a) $x^2 - 4x - 1 = 0$ b) $-5x^2 + 8x - 10 = 0$ c) $x^2 + 5x - 8 = 0$
 d) $m^2 - 5m + 3 = 0$ e) $x^2 - 12x + 35 = 0$
- Find the zeroes of the following quadratic functions.
 a) $y = (x - 1)(x + 4)$ b) $y = -(2x + 1)(5x - 9)$ c) $y = x(x + 10)$
 d) $y = x^2 - 8x - 20$ e) $y = -4x^2 + 20x$ f) $y = -2x^2 + 14x + 36$
- For d and e in question 5 above, find the co-ordinates of the vertex and sketch.
- Express the following equations in standard form.
 a) $y = 2(x + 1)(x - 3)$ b) $y = -(x + 5)(2x + 1)$ c) $y = (x - 4)^2 + 5$ d) $y = 3(x + 2)^2 - 10$
- Find the equations of the following quadratic functions in factored form.
 a) zeroes: 2 and -5 and passes through (-1, -48)
 b) zeroes: -7 and 8 and has y-intercept 56.
- Find the equation of each of the following quadratic functions in vertex form.
 a) vertex is (-8, -3) and passes through (-4, 13)
 b) vertex is (2, 4) and passes through (3, -1)
- Without sketching, state the direction of the opening, the co-ordinates of the vertex, the equation of the axis of symmetry and the maximum or minimum value.
 a) $y = -\frac{1}{2}x^2 + 1$ b) $y = (x + 3)^2 + 2$ c) $y = 5(x - 3)^2 - 7$
- Express the following equations in vertex form, then sketch.
 a) $y = x^2 - 4x + 1$ b) $y = -x^2 - 6x + 1$ c) $y = 3x^2 - 6x - 8$
- The height of a golf ball after being hit is described by the function $h = -5t^2 + 20t$, where h metres is the height, t seconds after the ball has been hit.
 a) what is the maximum height of the ball?
 b) how many seconds after impact is the maximum height reached?
 c) when does the ball hit the ground?

- Use finite differences to determine whether each function is linear, quadratic, or neither.

a)

x	y
0	7
1	9
2	15
3	25

b)

x	y
2	-5
4	-11
6	-17
8	-23

The End! For additional review, it is recommended that you re-do your unit tests.