

Scores

page one: number correct max 5 x 4 = max 20 minus number wrong _____ = max 20 (A)

problem 6: max 20 (B) problem 7: max 10 (C) **Total score (A) + (B) + (C) max 50**

Math Field Day Short Course Event Name(s) KEY (Bob Furry)

50 points total School _____

Instructions: Work alone or with a team. You should use the formulas provided, your calculator, and your notes.

Page One Instructions: Record your answers by circling the letter to the right. Each correct answer is worth 4 points; one point will be deducted for each wrong answer. (Page one consists of 5 questions. Maximum score on page 1 is 20 points.)

	In problems 1 through 5 you are to choose the <u>closest answer</u> .	Circle the letter of the correct answer
1.	<p>Annual maintenance costs for a particular section of highway pavement are \$2000. The placement of a new surface would reduce the annual maintenance cost to \$500 per year for the first 5 years and to \$1000 per year for the next 5 years. The annual maintenance after 10 years would again be \$2000. If maintenance costs are the only saving, what maximum investment can be justified for the new surface? Assume interest at 4%.</p> <p>(a) \$5,500 (b) \$7,170 (c) \$10,000 (d) \$10,340 (e) \$12,500</p>	<p>a b c < d > e</p>
2.	<p>Given a sum of money Q that will be received six years from now. At 5 percent compound interest the present worth now of Q is \$60.00. At this same interest rate, what would be the value of Q ten years from now?</p> <p>(a) \$60.00 (b) \$76.78 (c) \$90.00 (d) \$97.73 (e) \$120.00</p>	<p>a b c < d > e</p>
3.	<p>A certain piece of property is purchased for \$10,000 and yields a \$1000 yearly profit. If the property is sold after 5 years, what is the minimum price to break even, with interest at 6 percent?</p> <p>(a) \$5,000 (b) \$6,500 (c) \$7,745 (d) \$8,314 (e) \$10,000</p>	<p>a b < c > d e</p>
4.	<p>A steam boiler is purchased on the basis of guaranteed performance. A test indicates that the operating cost will be \$300 more per year than the manufacturer guaranteed. If the expected life of the boiler is 20 years and money is worth 8 percent, how much should the purchaser deduct from the purchase price to compensate for the extra operating cost?</p> <p>(a) \$2945 (b) \$3320 (c) \$4102 (d) \$5520 (e) \$6000</p>	<p>< a > b c d e</p>
5.	<p>A personal computer system costs \$18,000, and annual maintenance is \$900. After 3 years the salvage value of the system is \$3,000. If the interest rate is 8%, the equivalent uniform annual cost is</p> <p>(a) \$6,960 (b) \$6,922 (c) \$7,288 (d) \$7,499</p>	<p>< a > b c d e</p>

(over)

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Math Field Day Short Course Event Name(s) KEY (Bob Furry)

Problem 6 Instructions: Record your answers by circling the letter to the right. Each correct answer is worth 4 points; two points will be deducted for each wrong answer. The problem is worth a total of 20 points.

In problems 6a through 6d you are to choose the <u>closest</u> answer.						Circle the letter of the answer	
6.	Consider four mutually exclusive alternatives:						
		<i>Alternative</i>					
		<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>		
	Initial Cost	\$400.0	\$100.0	\$200.0	\$500.0		
	Uniform Annual Benefit	100.9	27.7	46.2	125.2		
Each alternative has a five-year useful life and no salvage value. Based on a 6% interest rate, compute the B/C ratio for each alternative:							
6a.	Alt. A	(a) 0.96	(b) 1.01	(c) 1.06	(d) 1.17	(e) 1.93	<i>a b <c> d e</i>
6b.	Alt. B	(a) 0.97	(b) 1.02	(c) 1.06	(d) 1.17	(e) 1.53	<i>a b c <d> e</i>
6c.	Alt. C	(a) 0.97	(b) 1.01	(c) 1.05	(d) 1.17	(e) 1.33	<i><a> b c d e</i>
6d.	Alt. D	(a) 0.96	(b) 1.01	(c) 1.05	(d) 1.13	(e) 1.23	<i>a b <c> d e</i>
6e.	Which alternative should be selected?						<i>a b c <d></i>

Problem 7 Instructions: Put your answers to parts (a) and (b) in the spaces provided; Circle the correct answer to part (c). The problem is worth a total of 10 points. Four points each for parts (a) and (b); two points for part (c). No credit for 7(c) if answers to parts (a) and (b) are missing or one or both are incorrect.

	Solve the following problem; enter the solutions in the column to the right. (Round to the nearest \$100.)	Enter the present worths in this column and circle the more economical alternative.
7.	<p>An old light capacity highway bridge may be strengthened at a cost of \$22,000, or it may be replaced by a new bridge at a cost of \$40,000. It is estimated that the old bridge, when reinforced, will last for 20 years, with a maintenance cost of \$500 per year and have a salvage value of \$10,000 at the end of 20 years. The estimated salvage value of the new bridge after 20 years of service is \$15,000. The maintenance of the new bridge will be \$100 per year. If interest is 6%, determine:</p> <p>(a) the present worth of the cost of strengthening the existing bridge.</p> <p>(b) the present worth of the cost of the new bridge.</p> <p>(c) which of the two alternatives is the more economical.</p>	<p>(a) \$ <u>24,617</u></p> <p>(b) \$ <u>36,470</u></p> <p>(c) The more economical alternative is (circle one):</p> <p>(i) <Strengthen Existing></p> <p>(ii) Build New</p>