Scores

page one: number correct_____ x 4 = _____ minus number wrong _____ = _____(A)

problem 6:_____(B) problem 7:_____(C) ***Total score (A)+(B)+(C)*** _____

Math Field Day Short Course Event Name(s) _____

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 closest answer. | Circle the letter of the correct answer |
|---|---|---|
| 1. | 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%.<br>(a) $5,500 (b) $7,170 (c) $10,000 (d) $10,340 (e) $12,500 | *a b c d e* |
| 2. | 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?<br>(a) $60.00 (b) $76.78 (c) $90.00 (d) $97.73 (e) $120.00 | *a b c d e* |
| 3. | 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?<br>(*a*) $5,000 (*b*) $6,500 (*c*) $7,745 (*d*) $8,314 (*e*) $10,000 | *a b c d e* |
| 4. | 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?<br>(*a*) $2945 (*b*) $3320 (*c*) $4102 (*d*) $5520 (*e*) $6000 | *a b c d e* |
| 5. | 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<br>(a) $6,960 (b) $6,922 (c) $7,288 (d) $7,499 | *a b c d e* |

(over)

Scores
page one: number correct_____ x 4 = _____ minus number wrong _____ = _____(A)

problem 6:_____(B) problem 7:_____(C) ***Total score (A)+(B)+(C)*** _____

Math Field Day Short Course Event Name(s) _____

***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 closest answer. | | | | | Circle the letter of the answer |
|---|---|---|---|---|---|---|
| 6. | Consider four mutually exclusive alternatives: | | | | | |
| | | | *Alternative* | | | |
| | | *A* | *B* | *C* | *D* | |
| | 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 | *a b c d e* |
| 6b. | Alt. B | (a) 0.97 | (b) 1.02 | (c) 1.06 | (d) 1.17 | (e) 1.53 | *a b c d e* |
| 6c. | Alt. C | (a) 0.97 | (b) 1.01 | (c) 1.05 | (d) 1.17 | (e) 1.33 | *a b c d e* |
| 6d. | Alt. D | (a) 0.96 | (b) 1.01 | (c) 1.05 | (d) 1.13 | (e) 1.23 | *a b c d e* |
| 6e. | Which alternative should be selected? | | | | | | *a b c d* |

***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. | 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:<br>(a) the present worth of the cost of strengthening the existing bridge.<br>(b) the present worth of the cost of the new bridge.<br>(c) which of the two alternatives is the more economical. | (a) $_____<br>(b) $_____<br>(c) The more economical alternative is (circle one):<br>(i) Strengthen existing<br>(ii) Build New |