



# PENNSYLVANIA SCIENCE OLYMPIAD 2008 STATE FINALS

## CIRCUIT LAB C DIVISION

**Answer  
KEY**

### SECTION 1

21 1. THEORETICAL QUANTITIES

Resistor	Resistance, $\Omega$	Current, A	Voltage, V
R <sub>1</sub>	55	0.289	15.9
R <sub>2</sub>	18	0.289	5.20
R <sub>3</sub>	10	0.289	2.89
R <sub>4</sub>	75	0.235	17.6
R <sub>5</sub>	100	0.0635	6.35
R <sub>6</sub>	15	0.172	2.58
R <sub>7</sub>	22	0.172	3.78

- 3 2. 0.404 W
- 3 3. 4.18 J
- 6 4. R<sub>6</sub> is shorted out
- 3 5. 0.00 V
- 3 6. 3.69 V

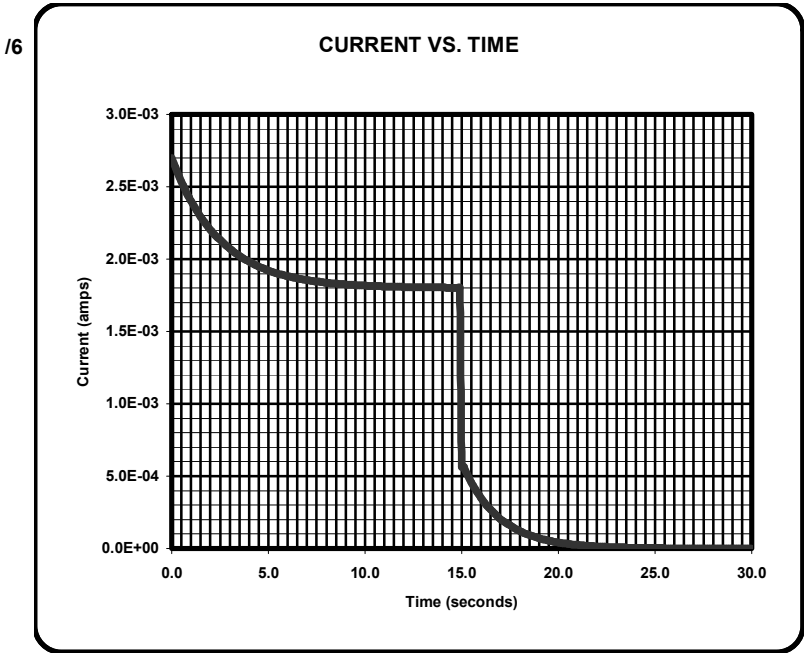
### SECTION 2

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|--|--|
| <ul style="list-style-type: none"> <li>3 1. 6.11 <math>\Omega</math></li> <li>3 2. 4.44 <math>\Omega</math></li> <li>3 3. 4.44 <math>\Omega</math></li> <li>3 4. 8.33 <math>\Omega</math></li> <li>4 5. A B D C</li> <li>2 6. 2R/3 0.667R</li> <li>4 7. C D B A</li> </ul> | <ul style="list-style-type: none"> <li>2 8. 6V/11R 0.545V/R</li> <li>4 9. C D B A</li> <li>2 10. 3V<sup>2</sup>/2R</li> <li>4 11. A B D C</li> <li>2 12. 9V/10 0.9V</li> <li>4 13. C D B A</li> <li>2 14. 2V/11 0.18V</li> </ul> |
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**177**

### SECTION 3

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|---|---|---|
| <ul style="list-style-type: none"> <li>2 1. 9.00 Volts</li> <li>3 2. 2.50 seconds</li> <li>3 3. 3.75 seconds</li> <li>3 4. 10 k<math>\Omega</math> 10000 <math>\Omega</math></li> </ul> | <ul style="list-style-type: none"> <li>3 5. 5 k<math>\Omega</math> 5000 <math>\Omega</math></li> <li>3 6. 4.00 Volts</li> <li>3 7. 9.00 Volts</li> <li>3 8. 0.0027 A</li> </ul> | <ul style="list-style-type: none"> <li>3 9. 0.000122 A</li> <li>3 10. 0.00224 C</li> <li>3 11. at 15 seconds</li> </ul> |
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School Code	School Name
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Participants

### SECTION 4

15 1. THEORETICAL QUANTITIES

Resistor	Voltage, V	Current, A	Direction
R <sub>1</sub>	2.14	0.429	UP
R <sub>2</sub>	3.86	0.386	DOWN
R <sub>3</sub>	0.857	0.0429	DOWN

14 2. V<sub>TH</sub> = 59.4 V

14 3. R<sub>TH</sub> = 23.0  $\Omega$

14 4.

### SECTION 5

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|--|---|
| <ul style="list-style-type: none"> <li>2 1. <math>\frac{\text{kg m}^2}{\text{s}^3 \text{ A}^2}</math></li> <li>2 2. <math>\frac{\text{kg m}^2}{\text{s}^3}</math></li> <li>2 3. <math>\frac{\text{kg m}^2}{\text{s}^3 \text{ A}}</math></li> <li>2 4. s A</li> <li>2 5. <math>\frac{\text{kg m}^2}{\text{s}^2}</math></li> </ul> | <ul style="list-style-type: none"> <li>2 6. <math>\frac{\text{s}^4 \text{ A}^2}{\text{kg m}^2}</math></li> <li>2 7. A</li> <li>2 8. <math>\frac{\text{kg m}}{\text{s}^3 \text{ A}}</math></li> <li>2 9. <math>\frac{\text{s}^3 \text{ A}^2}{\text{kg m}^2}</math></li> <li>2 10. <math>\frac{\text{kg m}}{\text{s}^2}</math></li> </ul> |
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Gustav Kirchoff - formulated the laws regarding conservation of charge and energy in electric circuits - junction law and loop law

