THIS TEST IS CLOSED BOOK, CLOSED NOTES, AND NO CALCULATORS!

Mark all answers on a SCAN-TRON 882 form. Use a # 2 pencil. Completely fill in the appropriate bubble. Be sure to properly erase all altered answers and stray marks!

For true/false questions, mark bubble A if the statement is true and bubble B if false. For multiple choice questions, mark the bubble corresponding to the answer you think best answers the question.

All questions carry equal weight. Read each question carefully before answering. There is no penalty for guessing. If you need extra room for your work, you can use the last (blank) page.

Before leaving the classroom, be sure you turn in both your SCAN-TRON form and this multi-page set of questions. You have until 12 o’clock to complete the exam. Budget your time appropriately. Good luck!

Possibly Useful Information

\[ d = vt \quad \text{density} \; \rho = M/V \quad c = 3 \times 10^8 \; \text{m/s} \]

For a sphere, \( V = \frac{4}{3} \pi R^3 \) and \( A = 4 \pi R^2 \)

For a circle, \( A = \pi R^2, \; C = 2 \pi R \quad \pi \approx 3.14 \)

There are about \( 3.2 \times 10^7 \) seconds in every year and \( 8.64 \times 10^4 \) (roughly \( 10^5 \)) seconds per day.

Kelvin = Celsius + 273 \quad \text{Fahrenheit} = \frac{9}{5} \text{Celsius} + 32

1 A. U. = \( 1.5 \times 10^8 \) km \quad 1 light year (ly) \approx 63,000 A. U. \approx 9.5 \times 10^{12} \text{ km} \approx 10^{13} \text{ km}

1 pc = 3.26 ly \approx 3 \times 10^{18} \text{ cm} \approx 3 \times 10^{13} \text{ km} \quad 1 \text{ Å} = 10^{-8} \text{ cm} = 10^{-10} \text{ m}

60'' (arcsec) = 1' (arcmin) = 60' = 1° (degree) \quad 360° = \text{full circle} = 2\pi \text{ radians} = 24 \text{ hours}

\[ \lambda_{\text{peak}} T \approx 3 \times 10^7 \; \text{Å} \quad K = 0.3 \text{ cm} K \quad \lambda \nu = c \quad P = 1/\nu \quad \text{resolution} \propto \lambda/D \]

\[ \text{energy/area/sec} = \sigma T^4 \quad \text{luminosity} = \text{energy/sec} = 4\pi R^2 \sigma T^4 \quad (\text{for a sphere}) \]

\[ E = h \nu \quad F = GM_1 M_2 / d^2 \quad (\lambda - \lambda_0) / \lambda_0 = \Delta \lambda / \lambda_0 = v / c \]

\[ P^2 = k R^3 \quad \text{where} \; k \approx \text{constant} \approx 4\pi^2 / (GM_1) \quad \text{if} \; M_1 \gg M_2 \]

In general, \( P^2 = (4\pi^2 R^3) / [G(M_1 + M_2)] \) \quad \text{For planets,} \; v \propto 1/\sqrt{R} \]
Chapter 1
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(2) page 20, question 17
(3) page 20, question 18
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(5) page 20, question 20

Chapter 2
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Chapter 3
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Chapter 4
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Chapter 5

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Chapter 6

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(33) page 151, question 44
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Chapter 7

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(36) page 179, question 29
(37) page 179, question 31
(38) page 180, question 33

Chapter 8

(39) page 209, question 30
(40) page 209, question 34

Answers

(1) false (2) distance (3) a (4) e (5) b (6) a. 5 \times 10^3 \, K \, b. 1500 \, \text{Å}, \text{which is in the ultraviolet}\ (7) 2^{1/2} \approx 1.2 \text{ times hotter (8) true (9) false (10) d (11) b (12) e (13) false (14) false (15) e (16) b (17) a (18) true (19) false (20) b (21) d (22) e (23) b (24) 3 \text{ years (25) true (26) false (27) true (28) b (29) c (30) c (31) false (32) e (33) b (34) e (35) false (36) true (37) d (38) b (39) true (40) c}