**The Official Guide for GMAT Review, 2017**

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**The full Chapter 4 replacement (PDF) can be found here.**

**Chapter 3**

Page 20, #3:

3. The sequence $a_1, a_2, a_3, \cdots, a_n, \cdots$ is such that $a_n = \frac{a_{n-1} + a_{n-2}}{2}$ for all $n \geq 3$. If $a_3 = 4$ and $a_5 = 20$ what is the value of $a_6$?

(A) 12
(B) 16
(C) 20
(D) 24
(E) 28

Page 25, #35:

35. What is the value of $w + q$?

(1) $3w = 3 - 3q$
(2) $5w + 5q = 5$

Page 45, #1 Answer Explanation:

(A) $5(4.00) + 15.90$
(B) $5(4.00) + 15.95$
(C) $5(4.00) + 16.00$
(D) $5(4.00 - 0.01) + 15.90$
(E) $5(4.00 - 0.05) + 15.95$

Page 46, #3 Answer Explanation:

$20 = \frac{a_4 + 4}{2}$ substitute known values

$40 = a_4 + 4$ multiply both sides

$36 = a_4$ subtract 4 from both sides

Then, letting $a_n = a_6$, substitute the known values:

Page 48, #7 Answer Explanation:

(1) If Harry is to be secretary, he first CANNOT have been chosen for president, and then he must be chosen for secretary. The probability that he will be chosen for president is $\frac{1}{10}$, so the probability of his NOT being chosen for president is $1-\frac{1}{10}=\frac{9}{10}$. Then, the

Page 48, #8 Answer Explanation:

$$\text{average}=\frac{\frac{2}{5}d+\frac{1}{10}d}{2}=\frac{\frac{4}{10}d+\frac{1}{10}d}{2}=\frac{\frac{5}{10}d}{2}=$$
$$\frac{1}{2}d\left(\frac{1}{2}\right)=\frac{1}{4}d$$

Page 49, #10 Answer Explanation:

$a+x+z=180$
$b+v+y=180$
$c+x+w=180$
$d+v+z=180$
$e+y+w=180$

Summing these 5 equations gives:

Page 50, #12 Answer Explanation:

**Column 1**

**Arithmetic; Algebra Percents**
**Simultaneous equations**

Because $y$ is a positive integer, $y$ percent is notated as $\frac{y}{100}$. According to the problem, $y=0.50(0.50x)$ and $\left(\frac{y}{100}\right)x=100$.

**Column 2**

$x(0.25x)=10,000$
$0.25x^2=10,000$ simplify left side

Page 50, #13 Answer Explanation:

13. If $s$ and $t$ are positive integers such that $\frac{s}{t}=64.12$, which of the following could be the remainder when $s$ is divided by $t$?

Page 51, #15 Answer Explanation:

**Arithmetic** Properties of numbers

The prime numbers less than 20 are 2, 3, 5, 7, 11, 13, 17, and 19. Their product is 9,699,690 (arrived at as follows: $2 \times 3 \times 5 \times 7 \times 11 \times 13 \times 17 \times 19 = 9{,}699{,}690$). This is closest to $10{,}000{,}000 = 10^7$ ($10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 = 10{,}000{,}000$).

Page 54, #23 Answer Explanation:

III. $\frac{24}{18} = 1\frac{1}{3}$ 18 is NOT a factor of 24 NEED NOT be a multiple of 18

Page 56, #27 Answer Explanation:

If, however, the cost of each minute after the first minute were \$0.15, then the cost of the first minute would be \$0.65. Then \$6.50 – \$0.65 would be \$5.85, and this in turn, when divided by \$0.15,

Page 58, #33 Answer Explanation:

(1) If $5^x < 1$, then $\frac{5^{x+2}}{25} < 1$ since $\frac{5^{x+2}}{25} = \frac{5^x \cdot 5^2}{25} = 5^x$; SUFFICIENT.

Page 60, #40 Answer Explanation:

(1) $k = 0.8p$

(2) $k = 8$

**Arithmetic** Interest problem

With simple annual interest, the formula to use is interest = principal × rate × time. It is given that $\$500 = \$5{,}000 \times \frac{p}{100} \times 1$ (year), so $p = 10$ percent interest.

(1) If $p$ is 10 percent, then $k = 0.8p$ is 0.08. Using the same formula, the time is again 1 year; the interest is the same amount; and the rate is 0.08, or 8 percent. Thus, \$500 = principal × 0.08 × 1, or principal \$6,250; SUFFICIENT.

Page 60, #41 Answer Explanation:

If $\frac{x+y}{z} > 0$, then either one of two cases holds true. Either $(x+y) > 0$ **and** $z > 0$, or $(x+y) < 0$ **and** $z < 0$. In other words, in order for the term to

Page 69, #56 Answer Explanation:

D The author agrees that both the brain and the stomach act as processors; believes that the computer, a nonmechanical device, can simulate the brain; and offers a way

Page 71, #61 Answer Explanation:

61. The *view* mentioned in line 17 of the passage refers to which of the following?

**Inference**

To find what this appearance of *view* refers to, it is necessary to look back to the beginning of the

Page 72, #61 Answer Explanation:

D A number of women historians have said that working-class mothers did not always share the *view* of middle-class women reformers about child labor.

Page 72, #62 Answer Explanation:

**Evaluation**

In lines 10–12, the author asserts that child labor laws *pitted women of different classes against one another*. The view of the middle-class women reformers is stated, and then, to show that

Page 73, #64 Answer Explanation:

**Supporting ideas**

This question is based on information explicitly stated in the final sentence of the passage. Women reformers viewed *child labor as a terribly exploitative practice* but they *failed to take account of the economic needs of working-class families.*

Page 84, #75 Answer Explanation:

A The contaminated vaccine is said to have caused *some* cases, not *most*; the question remains why the survey results pose no obstacle to the researchers' claim.

Page 92, #83 Answer Explanation:

**Column 1:**

**Comparison-contrast; Modifying clause**

The contrast introduced by *unlike* must be logical and clear. Contrasting *the buildings in Mesopotamian cities* with *the same basic plan* does not make sense; *Mesopotamian cities* should be contrasted with *the cities of the Indus Valley*. Also, it needs to be clear that it was the *buildings* in the cities that were *arranged haphazardly* rather than the *cities*. The second half of the sentence needs *houses were laid out* to be parallel in structure to *and houses and walls were built*.

**Column 2:**

B Illogically contrasts *the buildings in Mesopotamian cities* with *the same basic plan*; does not clarify what *which were haphazard in arrangement* modifies.

Page 93, #84 Answer Explanation:

**Logical predication; Rhetorical construction**

The pronoun *it* (*it saves seven dollars*) has no

Page 94, #85 Answer Explanation:

*the bird itself* is a noun phrase and matches the noun phrases *grassy fields* and *old pastures*.

A Illogically compares *the sandpipers vanishing* to *grassy fields and old pastures*; omits apostrophe in *sandpipers' vanishing*; wordy.

**B** **Correct.** This sentence properly compares *the bird itself* to *grassy fields and old pastures;*

Page 97, #90 Answer Explanation:

*students*, and *groups*. To which of these three does *they* refer? It would appear that the *universities* must

Page 99, #94 Answer Explanation:

introduced by *that*. The verb tenses are logical and parallel: *who have been blind* and *who have never*

**Chapter 4** [(Click here to download a fully revised pdf of Chapter 4.)]

**Chapter 5**

Page 156, #46:

46. Which of the following equations is NOT equivalent to $10y^2 = (x + 2)(x - 2)$?

(A) $30y^2 = 3x^2 - 12$

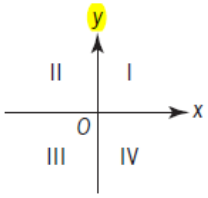
(B) $20y^2 = (2x - 4)(x + 2)$

(C) $10y^2 + 4 = x^2$

(D) $5y^2 = x^2 - 2$

(E) $y^2 = \frac{x^2 - 4}{10}$

Page 157, #49:

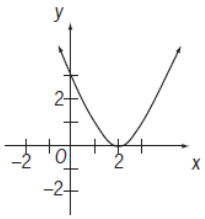



49. The graph of the equation $xy = k$, where $k < 0$, lies in which two of the quadrants shown above?

Page 183, #224:

224. List $T$ consists of 30 positive decimals, none of which is an integer, and the sum of the 30 decimals is $S$. The estimated sum of the 30 decimals, $E$, is defined as

Page 189, #8 Answer Explanation:




8. On the graph above, when $x = \frac{1}{2}$, $y = 2$; and when $x = 1$, $y = 1$. The graph is symmetric with respect to the vertical line at $x = 2$. According to the graph, when $x = 3$, $y =$

Page 205, #63 Answer Explanation:

I. $\left(\sqrt{82} + \sqrt{82}\right)^2$

II. $(82)\left(\sqrt{82}\right)$

III. $\frac{\left(\sqrt{82}\right)\left(\sqrt{82}\right)}{82}$

Page 226, #125 Answer Explanation:

the data values are listed in increasing order from left to right, and so the largest data value is $120 + \frac{Q-1}{2}$. Alternatively, it is evident that

Page 227, #127 Answer Explanation:

**Geometry Area**

The semicircle has a radius of 2 ft, and thus its area is $\frac{1}{2}\pi(2^2) = 2\pi$ ft$^2$. The rectangle has dimensions 4 ft by 8 ft, where $8 = 10 - 2$ is the full height of the window minus the radius of the semicircle, and thus has area $(4)(8) = 32$ ft$^2$. Therefore, in square feet, the area of the window is $32 + 2\pi$.

Page 246, #180 Answer Explanation:

$= x - y$ combine like terms

Page 248, #187 Answer Explanation:

$$\begin{aligned}(5 \odot 45) \odot 60 &= \sqrt{(5)(45)} \odot 60 \\ &= \sqrt{(5)(5)(9)} \odot 60 \\ &= (5)(3) \odot 60 \\ &= 15 \odot 60 \\ &= \sqrt{(15)(60)} \\ &= \sqrt{(15)(15)(4)} \\ &= (15)(2) \\ &= 30\end{aligned}$$

Page 253, #202 Answer Explanation:

$$\left(\frac{(\text{ratio after increases}) - (\text{ratio before increases})}{(\text{ratio before increases})} \times 100\right)\%$$

$$= \left[\left(\frac{(\text{ratio after increases})}{(\text{ratio before increases})} - 1\right) \times 100\right]\%$$

Page 254, #205 Answer Explanation:

$\left(\frac{(\text{total revenue}) - (\text{total initial cost})}{(\text{total initial cost})} \times 100\right)\% =$
$\left(\left(\frac{(\text{total revenue})}{(\text{total initial cost})} - 1\right) \times 100\right)\%$. Using the numerical expressions obtained above,
$\frac{(\text{total revenue})}{(\text{total initial cost})} - 1$

Page 256, #209 Answer Explanation:

Alternatively, the number of ways to select the locations of the 2 occurrences of the letter I can be determined by using $\binom{5}{2} - 4 = \frac{5!}{(2!)(3!)} - 4 = 10 - 4 = 6$, which is the number of

Page 259, #216 Answer Explanation:

$m\angle x = m\angle z + 90°$, or

$m\angle x = 50° + 90° = 140°.$

Thus, $x + y = 140 + 130 = 270.$

Page 262, #222 Answer Explanation:

| | |
|---|---|
| $4 = x^2$ | subtract $x$ from both sides |
| $\pm 2 = x$ | take the square root of both sides |

Page 266, #229 Answer Explanation:

Alternatively, $\frac{(x+2)(x+3)}{x-2}$ will be zero if and only if $(x + 2)(x + 3) = 0$, which has two integer solutions less than 5, namely, $x = -2$ and $x = -3$.

Page 266, #230 Answer Explanation:

230. The value of $\frac{2^{-14} + 2^{-15} + 2^{-16} + 2^{-17}}{5}$ is how many times the value of $2^{-17}$?

(A) $\frac{3}{2}$

(B) $\frac{5}{2}$

(C) 3

(D) 4

(E) 5

**Arithmetic** Negative exponents

If the value of $\frac{2^{-14} + 2^{-15} + 2^{-16} + 2^{-17}}{5}$ is $x$ times the value of $2^{-17}$, then

$$x\left(2^{-17}\right) = \frac{2^{-14} + 2^{-15} + 2^{-16} + 2^{-17}}{5}$$

$$x = \frac{\frac{2^{-14} + 2^{-15} + 2^{-16} + 2^{-17}}{5}}{2^{-17}}$$

$$= \frac{2^{-14} + 2^{-15} + 2^{-16} + 2^{-17}}{5} \times 2^{17}$$

$$= \frac{\left(2^{-14} + 2^{-15} + 2^{-16} + 2^{-17}\right) \times 2^{17}}{5}$$

## Chapter 6

Page 312, #285 Answer Explanation:

**Arithmetic** Applied problems

Since the rate at which the conveyor belt moves is given as 120 centimeters per second, which is equivalent to $\frac{120}{100} = 1.2$ meters per second, the conveyor will move less than 90 meters if it moves for less than $\frac{90}{1.2} = 75$ seconds.

Page 314, #290 Answer Explanation:

(1) Since the markup on the television is 25 percent of the cost, $M = 0.25C$. Then, $S = C + 0.25C = 1.25C$ and $\frac{M}{S} = \frac{0.25C}{1.25C} = 0.20$,

Page 321, #309 Answer Explanation:

(1) Since the charge for a 2-mile ride is \$0.90, $f + m = 0.90$, and so $f + 9m = 0.90 + 8m$, but the value of $m$ is unknown; NOT sufficient.

Page 335, #342 Answer Explanation:

Given (1) and (2) together, let $AC = CB = x$ be the length of the legs of the isosceles triangle $ABC$. Then, from $(AC)^2 = 2(AD)^2$, it follows that $x^2 = 2(AD)^2$, and hence $AD = \frac{x}{\sqrt{2}}$. Also, by the Pythagorean theorem applied to $\Delta ABC$, it follows that $AB = \sqrt{x^2 + x^2} = x\sqrt{2}$. Therefore, it follows that $(AC)(CB) = (x)(x) = x^2$ and $(AD)(AB) = \left(\frac{x}{\sqrt{2}}\right)\left(x\sqrt{2}\right) = x^2$, and so $(AC)(CB) = (AD)(AB)$.

Page 344, #367 Answer Explanation:

**Column 1:**

are 12 and 14, then using the reasoning shown above, $8s_M^2 = 10s^2 - (12 - 13)^2 - (14 - 13)^2 = 10s^2 - 2$. On the other hand, if 4 and 22 are the numbers removed, then $8s_M^2 = 10s^2 - (4 - 13)^2 - (22 - 13)^2 = 10s^2 - 162$. Since $10s^2 - 2 \neq 10s^2 - 162$, $8s_M^2$ can vary, and hence $s_M$ can vary; NOT sufficient.

**Column 2:**

$8s_M^2 = (4-11)^2 + (6-11)^2 + (8-11)^2 + \cdots + (18-11)^2 = 176.$

But if the other number removed is 12, then the average is $\frac{4+6+8+10+14+16+18+20}{8} = 12$

and

$8s_M^2 = (4-12)^2 + \cdots + (10-12)^2 + (14-12)^2 + \cdots + (20-12)^2 = 240.$

Because $8s_M^2$ varies, so does $s_M$; NOT sufficient.

Page 345, #368 Answer Explanation:

(2) Given $J = 120{,}000$, the following two cases include every possibility consistent with $T + J + S = (3)(120{,}000)$, or $T + S = (2)(120{,}000)$.

**Chapter 7**

Page 394, Passage:

(25) and relying on general, sweeping economic indicators may mask substantial variations among these different enterprises. For example, recent analyses of previously unexamined data on textile manufacturing in Brazil and Mexico suggest that the (30) Great Depression had a more severe impact on this Latin American industry than scholars had recognized.

Page 394, #460:

(E) demonstrate that the Great Depression had a more severe impact on industry in Latin America than in certain other regions

Page 429, #412 Answer Explanation:

**Main idea**

This question depends on understanding the passage as a whole. The passage begins by describing a long-held belief regarding humans' circadian rhythms: that the SCNs control them. It then goes on to explain that new findings have led scientists to believe that other organs and tissues may be involved in regulating the body's circadian rhythms as well.

Page 444, #437 Answer Explanation:

then illustrates that arboreal snakes have hearts closer to their heads to help keep blood flowing to their brains when they are in vertical postures.

Page 446, #440 Answer Explanation:

A The passage states that snakes have hearts closer to their heads to more efficiently circulate blood to the brain.

Page 459, #462 Answer Explanation:

**Application**
The question involves applying information from outside the passage to a claim made by the author. The text in lines 25–27 asserts that broad economic indicators pertaining to a nation or region can obscure differences between individual firms or industries within that nation or region. The question asks which evidence would most strengthen the support for that conclusion.

A This refers only to the relationship between a single industry's profits and its output, not to general economic indicators.
B **Correct.** The phrase *a national recession* refers to a general economic indicator.

Page 482, #503 Answer Explanation:

B The passage refers to the costs of clinical trials only as they concern the collection, storage, and analysis of data collected from participants.

Page 504, #542 Answer Explanation:

D **Correct.** The tunneling particle could have as low a speed in thicker barriers as in thinner ones and simply take longer to make its way through a thicker barrier.

## Chapter 8

Page 570, #565 Answer Explanation:

565. Physician: The hormone melatonin has shown promise as a medication for sleep disorders when taken in synthesized form. Because the long-term side effects of synthetic melatonin are unknown, however, I cannot recommend its use at this time.

Patient: Your position is inconsistent with your usual practice. You prescribe many medications that you know have serious side effects, so concern about side effects cannot be the real reason you will not prescribe melatonin.

The patient's argument is flawed because it fails to consider that

Page 596, #591 Answer Explanation:

**Reasoning** *What conclusion do the stated facts support?* Since declining biodiversity causes white-footed mouse populations to increase, and white-footed mice are especially likely to pass Lyme disease to ticks,

Page 602, #597 Answer Explanation:

**Situation** Broad-leaved weeds can be controlled in the spring for forty-five days by plowing fall-sown rye into the soil. But major agricultural crops take more than forty-five days to mature, and the rye-

Page 657, #652 Answer Explanation:

**Reasoning** *Which option most logically completes the argument?* For the proponents' claim to be misleading it needs to be suggesting something about irradiation that is false. By stating that irradiation destroys no more B1 than cooking does, the proponent seems to be suggesting that any food that is going to be cooked might as well be irradiated because it will end up with the same amount of B1 either way. But if the effects of irradiation and cooking combine to destroy more B1 than cooking or irradiation alone would, then the proponents' claim suggests something that is false.

Page 659, #654 Answer Explanation:

**Reasoning** *The question is which option would most weaken the argument?* The arguer infers that stores that leave because of the SpendLess will be replaced in their locations by other stores because that is what happened after the Colson's department store came in. Since the reasoning relies on a presumed

Page 662, #657 Answer Explanation:

**Argument Construction**

**Situation** Television assemblers in Vernland are paid less than those in neighboring Borodia. The number of televisions sold in Borodia has not dropped since its tariffs on Vernlandian TVs were lowered three years ago, but the number of TV assemblers in Borodia has. So TV imports from Vernland have likely increased.

## Chapter 9

Page 676, Diction, line 19:

Correct: "There's nothing like biking on a warm, autumn day." Incorrect: "There's nothing as biking on a warm, autumn day."

Page 679, lines 2. 6, 19, 23, 27, 31:

*Past perfect:* This verb form is used with *had* to show the order of two events that took place in the past.
*Example:*
Correct: "By the time I left for school, the cake had been baked."

*Future perfect:* Used with *will have,* this verb form describes an event in the future that will precede another event.
*Example:*
Correct: "By the end of the day, I will have studied for all my tests."

*Present perfect progressive:* Used with *have been* or *has been*, this verb tense describes something that began in the past, continues into the present, and may continue into the future.
*Example:*
Correct: "The student has been studying hard in the hope of acing the test."

*Past perfect progressive:* Used with *had been,* this verb form describes an action of some duration that was completed before another past action occurred.
*Example:*
Correct: "Before the fire alarm rang, the student had been studying."

*Future perfect progressive:* Used with *will have been*, this verb form describes a future, ongoing action that will occur before a specified time.
*Example:*
Correct: "By the end of next year, the students will have been studying math for five years."

Page 690, #712:

712. In the early part of the twentieth century, many vacationers found that driving automobiles and sleeping in tents allowed them to enjoy nature close at hand and tour at their own pace, with none of the restrictions of passenger trains and railroad timetables or with the formalities, expenses, and impersonality of hotels.

Page 723, #687 Answer Explanation:

B The modifying clause *that never … Sun* distorts the meaning of the sentence; also, without punctuation, the phrase *on the surface of the Sun the Sun's poles or equator* is ungrammatical and makes no sense.

Page 730, #703 Answer Explanation:

703. Written early in the French Revolution, Mary Wollstonecraft's *A Vindication of the Rights of Man* (1790) and *A Vindication of the Rights of Woman* (1792) attributed Europe's social and political ills to be the result of the dominance of aristocratic values and patriarchal hereditary privilege.

Page 748, #734 Answer Explanation:

**B** **Correct.** The three activities are presented in parallel form: *creation of Buddha images* and *construction and decoration of the temples.*

Page 755, #747 Answer Explanation:

C *It is so genetically similar* is incorrect because there is no explicit statement of what the ant is similar to.

**D** **Correct.** The clause with *similar* uses the plural *they* and an explicit *to one another*, and agreement is respected between *ants* and *fellows*.

E The plural *fellows* and singular *a close relative* do not agree.