

## ANSWER KEY

Critical Reading													
Section 3				Section 6				Section 8					
COR. ANS.	DIFF. LEV.			COR. ANS.	DIFF. LEV.			COR. ANS.	DIFF. LEV.			COR. ANS.	DIFF. LEV.
1. A	2	13. C	4	1. A	1	13. A	3	1. D	2	11. A	4		
2. C	2	14. A	3	2. B	3	14. A	4	2. B	2	12. A	3		
3. A	3	15. D	3	3. E	2	15. D	3	3. A	2	13. D	2		
4. D	3	16. B	4	4. B	3	16. B	4	4. C	3	14. B	3		
5. B	3	17. A	4	5. E	4	17. C	3	5. E	4	15. A	4		
6. E	3	18. A	5	6. C	3	18. D	5	6. B	5	16. A	3		
7. B	4	19. D	3	7. D	3	19. B	4	7. C	2	17. D	3		
8. C	5	20. C	3	8. C	4	20. A	3	8. E	4	18. D	3		
9. A	5	21. B	3	9. B	3	21. C	2	9. E	4	19. C	4		
10. D	3	22. E	3	10. E	2	22. B	3	10. C	3				
11. E	3	23. C	4	11. B	4	23. C	4						
12. B	4	24. D	4	12. C	3	24. E	4						
Number correct				Number correct				Number correct					
Number incorrect				Number incorrect				Number incorrect					
Math													
Section 2				Section 5				Section 7					
COR. ANS.	DIFF. LEV.			Multiple-Choice Questions		Student-produced Response questions		COR. ANS.	DIFF. LEV.			COR. ANS.	DIFF. LEV.
1. E	1	11. E	3					1. C	1	9. B	4		
2. B	2	12. E	3					2. E	2	10. A	3		
3. E	2	13. D	3					3. A	2	11. E	3		
4. D	2	14. B	3					4. D	2	12. E	4		
5. C	3	15. E	4					5. C	2	13. E	4		
6. D	2	16. C	3					6. C	3	14. C	4		
7. E	3	17. C	4					7. D	4	15. C	4		
8. D	3	18. C	4					8. A	3	16. A	5		
9. E	3	19. E	5										
10. B	3	20. C	5										
Number correct				Number correct				Number correct					
Number incorrect				Number incorrect				Number incorrect					
Writing													
Section 4						Section 9							
COR. ANS.	DIFF. LEV.			COR. ANS.	DIFF. LEV.	COR. ANS.	DIFF. LEV.			COR. ANS.	DIFF. LEV.		
1. A	1	11. E	4	21. E	4	31. B	3	1. C	1	11. B	3		
2. E	1	12. D	2	22. C	3	32. B	4	2. B	2	12. C	3		
3. B	2	13. B	1	23. C	3	33. D	3	3. B	2	13. D	4		
4. C	3	14. D	4	24. E	3	34. E	3	4. B	2	14. B	4		
5. D	2	15. D	3	25. B	3	35. A	3	5. A	3				
6. C	2	16. E	3	26. C	3			6. E	2				
7. A	4	17. C	2	27. E	4			7. D	3				
8. B	5	18. B	3	28. A	3			8. D	3				
9. B	4	19. C	3	29. C	4			9. B	3				
10. E	4	20. B	4	30. A	3			10. B	3				
Number correct						Number correct							
Number incorrect						Number incorrect							

NOTE: Difficulty levels are estimates of question difficulty that range from 1 (easiest) to 5 (hardest).

# Detailed Answer Key

## Section 2

1. **E** Just substitute 3 for  $x$ :  $5x = 3x + y$   
 Substitute:  $5(3) = 3(3) + y$   
 Simplify:  $15 = 9 + y$   
 Subtract 9:  $6 = y$   
 (Chapter 8, Lesson 1: Solving Equations)

2. **B** To buy 48 batteries in packages of 24, you will need two packages, which will cost  $2(\$12) = \$24$ . To buy them in packages of 6, you will need eight packages, which will cost  $8(\$4) = \$32$ . Buying in packages of 24 will save  $\$32 - \$24 = \$8$ .  
 (Chapter 9, Lesson 4: Rate Problems)

3. **E** You can probably solve this one best by quickly graphing each point and just inspecting. Clearly,  $(5, 5)$  lies outside the region.  
 (Chapter 10, Lesson 4: Coordinate Geometry)

4. **D** Interpret the statement as an equation:  
 $(\frac{1}{2})(2x) = 5$   
 Multiply by 2:  $(\frac{2}{2})(2x) = 10$   
 Multiply by 2:  $(\frac{4}{2})(4x) = 20$   
 (Chapter 8, Lesson 7: Word Problems)

5. **C** The smallest positive integer that is divisible by 12 and 16 is 48. If  $n$  is 48, the only factor among the choices is (C) 48.  
 (Chapter 7, Lesson 7: Divisibility)  
 (Chapter 8, Lesson 5: Factoring)

6. **D** The sum of the angles in a triangle is  $180^\circ$ , so  
 $a + b + 40 = 180$   
 Subtract 40:  $a + b = 140$   
 Add the given equation:  $+ (a - b) = 10$   
 $2a = 150$   
 Divide by 2:  $a = 75$   
 (Chapter 10, Lesson 2: Triangles)  
 (Chapter 8, Lesson 2: Systems)

7. **E** Choose  $n = 1$  as an example. Plugging this in to the choices gives answers of (A)  $\frac{1}{2}$  (B) 3 (C) 3 (D) 1 (E) 2. The only even number here is (E) 2.  
 (Chapter 9, Lesson 3: Numerical Reasoning Problems)

8. **D** Let  $c$  be the number of colas that Mike sold and  $r$  be the number of root beers. Since the total sold is 48,  $c + r = 48$ . Since he sold twice as many colas as root beers,  $c = 2r$ . Substituting this into the first equation gives

Simplify:  $2r + r = 48$   
 $3r = 48$   
 Divide by 3:  $r = 16$   
 (Chapter 8, Lesson 7: Word Problems)

9. **E** Pick two perfect squares for  $m$  and  $n$ , like 4 and 9. Plugging these in to the examples gives (A) 36 (B) 36 (C) 16 (D) 324 (E)  $-45$ . The only choice that is not a perfect square is (E)  $-45$ .  
 (Chapter 8, Lesson 4: Working with Roots)

10. **B** One option is to solve each equation by plugging in 10 for  $a$ :  $a + b = 10 + b = 9$   
 Subtract 10:  $b = -1$   
 Second equation:  $10 - c = 14$   
 Subtract 10:  $-c = 4$   
 Divide by  $-1$ :  $c = -4$   
 So  $c - b = -4 - (-1) = -4 + 1 = -3$   
 (Chapter 7, Lesson 6: Negatives)

11. **E** Since the average of four numbers is 8, the sum of those four numbers must be  $8 \times 4 = 32$ . Therefore  $a + b + 10 + 4 = 32$ . Subtracting 14 from both sides gives  $a + b = 18$ .  
 (Chapter 9, Lesson 2: Mean/Median/Mode Problems)

12. **E** Fill in the table above and to the left of the  $x$  by following the rule, like this:

0	1	2	3	4	5
1	2	4	7		
2	4	8	15		
3	7	15	$x$		
4					
5					

This shows that  $x = 15 + 15 = 30$ .  
 (Chapter 11, Lesson 5: Data Analysis)

13. **D** To maximize  $c$  you must minimize the value of  $a + b$ . Since the numbers must be positive and even, the least values that  $a$  and  $b$  can have are 2 and 4:  
 $a + b + c = 60$   
 Plug in:  $2 + 4 + c = 60$   
 Simplify:  $6 + c = 60$   
 Subtract 6:  $c = 54$   
 (Chapter 9, Lesson 3: Numerical Reasoning Problems)

14. **B** It is easier to pick a simple value for the “starting” population in 1980, like 100. Since the population increased by 10% from 1980 to 1990, the 1990 population must have been  $(100)(1.10) = 110$ . Since it decreased by 10% from 1990 to 2000, the 2000 population must have been  $(110)(0.90) = 99$ . From 1980 to 2000, then, the percent change was  $(99 - 100)/100 = -1/100 = -1\%$ .

(Chapter 7, Lesson 5: Percents)

15. **E** According to the definition of  $g$ ,  $g(3) = 2f(3) - 1$ . According to the table,  $f(3) = 11$ , so  $g(3) = 2f(3) - 1 = 2(11) - 1 = 22 - 1 = 21$ .

(Chapter 11, Lesson 2: Functions)

16. **C** Although you may substitute  $5y$  for  $x$  as a first step, it's probably easier to simplify the expression first:

$$\begin{aligned} & \sqrt{(x^2 - 2xy + y^2)} \\ \text{Factor:} & \quad \sqrt{(x - y)^2} \\ \text{Simplify:} & \quad |x - y| \\ \text{Substitute:} & \quad |5y - y| \\ \text{Simplify:} & \quad |4y| = 4y \end{aligned}$$

(Chapter 8, Lesson 4: Working with Roots)

(Chapter 8, Lesson 5: Factoring)

(Chapter 8, Lesson 6: Inequalities, Absolute Values, and Plugging In)

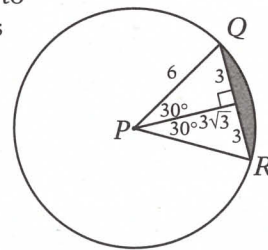
17. **C** Think of numbers that are larger than their squares. This excludes negatives, because the squares of negatives are always positive. It also excludes numbers greater than 1, because the squares of these are bigger than the original numbers. Therefore,  $0 < x < 1$ . This means I and II are true, but not III.

(Chapter 9, Lesson 3: Numerical Reasoning Problems)

18. **C** Believe it or not, you don't need to find the two midpoints in order to answer this question. You need to know only that the distance between the two mid-points is half of the distance between the two endpoints. The distance between the endpoints is  $(3x + 2) - (-x - 4) = 3x + 2 + x + 4 = 4x + 6$ . Half of this is  $2x + 3$ .

(Chapter 10, Lesson 4: Coordinate Geometry)

19. **E** Since all radii of a triangle are equal,  $PQ = PR$ . Since  $PQ = QR$  too, the triangle must be equilateral. Since its area is  $9\sqrt{3}$ , the lengths have the measures shown in the diagram. The circle has a radius of 6. The shaded region is equal to the area of the sector minus the area of the triangle. Since the central angle is  $60^\circ$ , the sector has an area that is  $\frac{1}{6}$  of the whole circle, or  $(\frac{1}{6})(\pi(6)^2) = 6\pi$ . Subtracting the area of the triangle gives  $6\pi - 9\sqrt{3}$ .



(Chapter 10, Lesson 3: The Pythagorean Theorem)

(Chapter 10, Lesson 5: Areas and Perimeters)

(Chapter 10, Lesson 8: Circles)

20. **C** If the ratio of boys to girls in a class is 3 to 5, then  $3/(3 + 5) = \frac{3}{8}$  of the class is boys and  $5/(3 + 5) = \frac{5}{8}$  of the class is girls. This means there are  $(\frac{3}{8})(160) = 60$  boys and  $(\frac{5}{8})(160) = 100$  girls in the senior class. Similarly, the fraction of boys in the junior class is  $\frac{3}{4}$  and the fraction of girls is  $\frac{1}{4}$ . If there are  $x$  students in the junior class, then there are  $(\frac{3}{4})x$  boys and  $(\frac{1}{4})x$  girls in the junior class. If the ratio of boys to girls is 1:1 when the classes are combined, then

$$\begin{aligned} 60 + (\frac{3}{4})x &= 100 + (\frac{1}{4})x \\ \text{Subtract } 60 \text{ and } (\frac{3}{4})x: & \quad (\frac{1}{4})x = 40 \\ \text{Multiply by } 5: & \quad x = 200 \end{aligned}$$

(Chapter 8, Lesson 7: Word Problems)

(Chapter 7, Lesson 4: Ratios and Proportions)

### Section 3

1. **A** A *six-month hiatus* (break) would cause her skills to *weaken*, something she might fear. *atrophy* = weaken from disuse; *align* = line up; *disseminate* = spread like seed

2. **C** *Domineering* opinions are overbearing and preachy. *vindictive* = inspired by revenge; *pedantic* = acting like a know-it-all; *conciliatory* = acting to bring people together; *treacherous* = betraying someone's confidence; *didactic* = preachy; *dogmatic* = condescendingly preachy; *prosaic* = ordinary

3. **A** The missing word must refer to Walter's *inability to make up his mind*. *vacillation* = inability to make up one's mind; *solicitation* = request for help; *rejuvenation* = restoration of one's youth; *admonishment* = mild reproof

4. **D** If a writer is *successful . . . even in the face of . . . rejections*, he or she must be very *persistent*. *affluence* = wealth; *haughty* = arrogant; *pertinacity* = strong persistence; *resilient* = able to endure hardship; *tenacity* = ability to hold fast; *relentless* = unwilling to give up; *stoutness* = courage or sturdiness; *craven* = cowardly

5. **B** The missing word must be in contrast to *direct, forceful stances*. *pontification* = haughty, self-important speech; *circumlocution* = indirect, evasive speech; *brevity* = conciseness

6. **E** The parallelism of the two clauses helps you to complete the sentence. If counselors *believe that criminals can change*, then they must *have faith in their changeability*. If they realize *that they can often return to their old habits*, they must be wary of *recidivism* (tendency to fall into old habits). *mutability* = changeability; *astuteness* = keen ability; *transcendence* = the quality of exceeding; *malleability* = ability to be bent; *relapse* = falling back into old ways

7. **B** If something is out of place in time, it is an *anachronism*. *anachronism* = something out of place in time; *idiom* = phrase with a meaning that is different from its literal meaning; *interlocutor* = someone who takes part in a conversation

8. **C** The sentence indicates that the “h” was evidence of an earlier time. *inference* = conclusion based on evidence; *analogy* = useful comparison; *vestige* = remaining trace; *anomaly* = unusual event; *quandary* = perplexing situation

9. **A** The passage states that language is used as *impenetrable walls* (line 7) between people, having biased connotations favoring one group over another.

10. **D** By saying that *we infer volumes* (lines 3–4), the author means that *we draw a lot of conclusions*.

11. **E** The passage states that instructing a child to tie shoes *the right way will defeat the child’s growing attempt at self-mastery* (lines 12–14).

12. **B** The last sentence states that *nagging* is a *constant reminder to the child of his or her lack of self-control* (lines 21–22).

13. **C** The author states that Modernism is *egotistical* (line 19) and *self-conscious* (line 21) and also that it *begins nowhere and with no one in particular* (lines 12–13), suggesting that it is both *self-centered* and *ill-defined*, but the paragraph does not mention Modernism being *politically oriented*.

14. **A** The passage states that *Critics and academics . . . prefer their artistic movements to be readily comprehensible* (lines 8–10), so they do *not* like those that are hard to understand.

15. **D** The quotation from James Joyce in the next sentence describes these *landmines as enigmas and puzzles that . . . will keep the professors busy for centuries arguing over what I meant* (lines 21–25). In other words, they are literary devices placed in his novels to baffle professors.

16. **B** The passage states that *plots . . . are submerged beneath wave after wave of . . . hyper-literary and meta-literary indulgences* (lines 32–37), so it suggests that plot is not as important as other things.

17. **A** The author states that it is *hard not to love modernism* (lines 38–39) but also uses critical terms like *posturing aberrations* (line 19) to describe it. In the last two lines, he refers to modernism as *reprehensible but somehow roguishly likeable*. This is a very *ambivalent* characterization of modernism.

18. **A** The comparison is a *metaphor* but not a *simile* because it states that the *modernist novel* is a *sociopath*. *Juxtaposition* is the placement of two images one on top of the another, as in *a sociopath and a cad*. *Personification* is giving human qualities to something that is not human.

19. **D** The purpose of the passage is to introduce the reader to the new science of genomics.

20. **C** A *pathogen* (line 8) is not part of the *immune system* (lines 7–8) but rather what the immune system responds to.

21. **B** The *orchestrated response of the immune system* (lines 7–8) is mentioned as an example of how *molecules convey information* (line 9).

22. **E** The fact that *through genomics massive amounts of information can be converted into an electronic format* (lines 36–38) is what *facilitates a dramatically new framework for understanding life* (lines 40–41).

23. **C** The passage suggests that *information theory . . . may seem unfit for . . . science* (lines 50–52) because *information . . . implies an underlying intent* (lines 48–50).

24. **D** The final paragraph indicates that genomic advances *have helped to propel the remarkable development of the computer and telecommunication industries* (lines 58–60) and suggests that they may help to *improve human health* (lines 61–62). This discusses *actual and potential consequences*.

## Section 4

- 
1. **A** The sentence is correct.
- 
2. **E** The underlined phrase should be a noun phrase that represents *one of the best features of the journalist's lifestyle*. Only (C) and (E) are noun phrases, and (E) is much clearer.  
(Chapter 15, Lesson 4: Comparison Problems)
- 
3. **B** The opening participial phrase modifies *Greg* and not *Greg's search*.  
(Chapter 15, Lesson 7: Dangling and Misplaced Participles)
- 
4. **C** Idiom requires *neither* to be followed by *nor*, and parallelism requires the *nor* to be followed by an adjective.  
(Chapter 15, Lesson 10: Idiom Errors)
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5. **D** The past participle of *to take* is *taken*, not *took*.  
(Chapter 15, Lesson 13: Irregular Verbs)
- 
6. **C** Although choice (D) is parallel in structure, its phrasing is nonstandard. The phrasing in (C) is both parallel and clear.  
(Chapter 15, Lesson 3: Parallelism)
- 
7. **A** The pronoun *he* is the subject of an implied verb, *he (did)*, so it is used correctly in the subjective form. Also, the phrase *admire his acting* is correct, because the object of the verb is *acting*, not *him*.  
(Chapter 15, Lesson 6: Pronoun Case)
- 
8. **B** *Neither* is the singular subject of the verb, so the verb should be *was*, not *were*. Also, the pronoun should be *its* because the subject is singular and a ram can only feel its own pain, not the pain of them both.  
(Chapter 15, Lesson 1: Subject-Verb Disagreement)  
(Chapter 15, Lesson 2: Trimming Sentences)  
(Chapter 15, Lesson 5: Pronoun-Antecedent Disagreement)
- 
9. **B** The participle *walking* modifies *Liz*, not *Liz's family*. Choice (D) makes this correction, but the modifiers are awkward and unclear.  
(Chapter 15, Lesson 7: Dangling and Misplaced Participles)  
(Chapter 15, Lesson 12: Other Modifier Problems)
- 
10. **E** The phrase *if not better* is an interrupter, so the sentence should read well even if it is omitted. The only phrasing that meets this criterion is (E).  
(Chapter 15, Lesson 2: Trimming Sentences)
- 
11. **E** The original is not a sentence but a fragment.  
(Chapter 15, Lesson 15: Coordinating Ideas)
- 
12. **D** The phrase *much closer* modifies the verb *study* and so should be in adverbial form: *much more closely*.  
(Chapter 15, Lesson 12: Other Modifier Problems)
- 
13. **B** The two clauses must be parallel: *has been so popular* would make this clause parallel to the first.  
(Chapter 15, Lesson 3: Parallelism)
- 
14. **D** This is a diction error. *Respectfully* means full of respect, which makes no sense here. The word should be *respectively*.  
(Chapter 15, Lesson 11: Diction Errors)
- 
15. **D** The verb *would have considered* is in the wrong tense and mood. It should be *consider*.  
(Chapter 15, Lesson 9: Tricky Tenses)  
(Chapter 15, Lesson 14: The Subjunctive Mood)
- 
16. **E** The sentence is correct.
- 
17. **C** The *fund deficit and the disillusionment* are not a single problem, but two *problems*.  
(Chapter 15, Lesson 4: Comparison Problems)
- 
18. **B** The subject of the verb is *either accepting or rejecting*. If the subject of a verb is an *either . . . or* construction, the verb must agree with the noun after the *or*, which in this case is *rejecting*. Since this is a singular noun, the verb should be *was*.  
(Chapter 15, Lesson 1: Subject-Verb Disagreement)
- 
19. **C** Since *defense attorneys* can be counted, the correct comparative word is *fewer*, not *less*.  
(Chapter 15, Lesson 4: Comparison Problems)
- 
20. **B** It is illogical to compare *service* to *other restaurants*. The phrase should be *the service at the other restaurants*.  
(Chapter 15, Lesson 3: Parallelism)
- 
21. **E** The sentence is correct.
- 
22. **C** This pronoun refers to *a child*, so it must be the singular *he* or *she*.  
(Chapter 15, Lesson 5: Pronoun-Antecedent Disagreement)
- 
23. **C** The phrase *not only A but also B* indicates a parallel structure. To make the structure parallel, the phrase should be replaced with *by*.  
(Chapter 15, Lesson 3: Parallelism)
- 
24. **E** The sentence is correct.

25. **B** The pronoun *he* is ambiguous. We are not certain which individual it is referring to. To correct the error, *he* should be changed to either Thomas Cowher or the Senator.

(Chapter 15, Lesson 5: Pronoun-Antecedent Disagreement)

26. **C** The sentence indicates that this occurred in the past by saying those who *were observing*. Therefore *are* should instead be *were*.

(Chapter 15, Lesson 1: Subject-Verb Disagreement)

27. **E** The sentence is correct.

28. **A** Between my brother and *I* should instead be between my brother and *me*. Subjective pronouns, such as *I*, should only be used as subjects. Objective pronouns, including *me*, can be used as objects of verbs or as objects of prepositions.

(Chapter 15, Lesson 6: Pronoun Case)

29. **C** The critic is writing about a *duo*, which is a singular subject. The *their* should therefore be replaced by *its*.

(Chapter 15, Lesson 5: Pronoun-Antecedent Disagreement)

30. **A** Choice (A) is the most concise and clear, and the phrasing is parallel.

(Chapter 15, Lesson 3: Parallelism)

(Chapter 15, Lesson 15: Coordinating Ideas)

31. **B** Sentence 3 presents an example of Plato's reasoning as described in sentence 2. Choice (C) may be tempting, but since the sentence does not extend the idea from sentence 2 but only provides an example, the word *furthermore* is inappropriate.

(Chapter 15, Lesson 15: Coordinating Ideas)

32. **B** The pronoun *they* and the noun *approximations* should agree in number. Choice (B) provides the most straightforward phrasing.

(Chapter 15, Lesson 5: Pronoun-Antecedent Disagreement)

(Chapter 15, Lesson 15: Coordinating Ideas)

33. **D** Sentence 6 does not fit because it shifts the discussion to what students dislike, rather than the nature of mathematical objects.

34. **E** Choice (E) provides the most logical, concise, and clear phrasing.

35. **A** Choice (A) provides the most logical, concise, and clear phrasing.

## Section 5

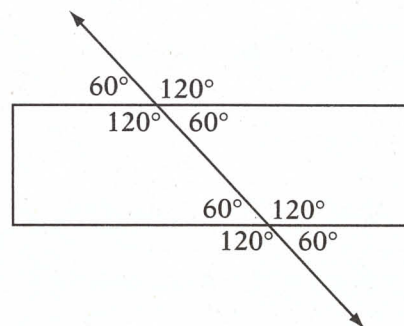
1. **E** If  $2x = 10$ , then  $4x = 20$ , and if  $3y = 12$ , then  $6y = 24$ , so  $4x + 6y = 20 + 24 = 44$ .

(Chapter 6, Lesson 4: Simplifying Problems)

2. **D** Set up the equation:  $(a + b + 4)/3 = 5$   
 Multiply by 3:  $a + b + 4 = 15$   
 Subtract 4:  $a + b = 11$

(Chapter 9, Lesson 2: Mean/Median/Mode Problems)

3. **C** If  $b = 2a$ , then  $a + 2a = 180$ , because the two angles form a linear pair. So  $3a = 180$  and  $a = 60$ . Your diagram should now look like this:



So  $d + e + g + h = 60 + 60 + 120 + 60 = 300$ .

(Chapter 10, Lesson 1: Lines and Angles)

4. **A** Substitute  $x = 100$  into the function:

$$\sqrt{\sqrt{100} - 1} = \sqrt{10 - 1} = \sqrt{9} = 3$$

(Chapter 11, Lesson 2: Functions)

5. **B** If  $2^m = 8$ , then  $m = 3$ . So  $3^{k+3} = 243$ . Checking the powers of 3 shows that  $k + 3 = 5$ . Therefore,  $k = 2$ , so  $2^k = 2^2 = 4$ .

(Chapter 8, Lesson 3: Working with Exponentials)

6. **C** If  $b$  varies inversely as the square of  $c$ , then the equation that relates them is  $b = k/c^2$  where  $k$  is some constant. To find the value of  $k$ , just plug in the given values for  $b$  and  $c$ :

$$8 = k/3^2$$

$$\text{Multiply by 9: } 72 = k$$

Therefore, the specific equation relating  $b$  and  $c$  is  $b = 72/c^2$ . To find the value of  $c$  when  $b = 2$ , just substitute and solve:

$$2 = 72/c^2$$

$$\text{Cross-multiply: } 2c^2 = 72$$

$$\text{Divide by 2: } c^2 = 36$$

$$\text{Take the square root: } c = \pm 6$$

(Chapter 11, Lesson 4: Variation)

7. **C** Each of the five teams must play four other teams three times apiece. In other words, each team must play in  $4 \times 3 = 12$  games. Since there are five teams, it might seem at first that there are a total of  $5 \times 12 = 60$  games, but since each game needs two teams, the total number of games is  $60/2 = 30$ .  
(Chapter 9, Lesson 5: Counting Problems)

8. **A** If pump A can fill the tank in 3 hours, then it will fill  $\frac{1}{3}$  of the tank in 1 hour, leaving  $\frac{2}{3}$  of the tank to fill. Pump B can fill  $\frac{1}{2}$  of the tank in an hour, so working together, the two pumps can fill  $\frac{1}{3} + \frac{1}{2} = \frac{5}{6}$  of the tank per hour. To fill  $\frac{2}{3}$  of the tank working together, then, takes  $(\frac{2}{3}) \div (\frac{5}{6}) = \frac{4}{5}$  hour, which equals  $(\frac{4}{5})(60) = 48$  minutes.  
(Chapter 9, Lesson 4: Rate Problems)

9. **7.5** Translate into an equation:  $4x - 5 = 25$   
Add 5:  $4x = 30$   
Divide by 4:  $x = 7.5$   
(Chapter 8, Lesson 7: Word Problems)

10. **13** «7» =  $7 + 6 + 5 + 4 + 3 + 2 + 1$   
«5» =  $5 + 4 + 3 + 2 + 1$   
So «7» - «5» =  $7 + 6 = 13$   
(Chapter 9, Lesson 1: New Symbol or Term Problems)

11. **100** Circumference =  $\pi d$ , so you can find the diameter:

$$\pi d = 10\pi$$

$$d = 10$$

Divide by  $\pi$ :  
This diameter is also the hypotenuse of a right triangle, so by the Pythagorean theorem,  $a^2 + b^2 = d^2 = 10^2 = 100$ .  
(Chapter 10, Lesson 3: The Pythagorean Theorem)  
(Chapter 10, Lesson 8: Circles)

12. **24** This is a "counting" problem, so it helps to know the fundamental counting principle from Chapter 9, Lesson 5. Since you are making a three-letter arrangement, there are three decisions to be made. The number of choices for the first letter is four; then there are three letters left for the second spot, then two left for the third spot. This gives a total of  $4 \times 3 \times 2 = 24$  possible arrangements.  
(Chapter 9, Lesson 5: Counting Problems)

13. **0.2 or 1/5** This is a simple substitution. You can substitute 10,200 for  $96,878 \times x^2$  because they are equal. So  $10,200 / (5 \times 96,878 \times x^2) = 10,200 / (5 \times 10,200) = \frac{1}{5}$ . Notice that the 10,200s "cancel."  
(Chapter 6, Lesson 4: Simplifying Problems)

14. **4** If each term is 1 less than 3 times the *previous* term, then each term is also  $\frac{1}{3}$  of the number that is

1 greater than the *successive* term. Since the fourth term is 95, the third term must be  $\frac{1}{3}$  of 96, which is 32. Repeating this shows that the second term is 11 and the first term is 4. Check your work by confirming that the sequence satisfies the formula.  
(Chapter 6, Lesson 7: Thinking Logically)  
(Chapter 11, Lesson 1: Sequences)

15. **0.8** If  $4 + \sqrt{b} = 7.2$  then  $\sqrt{b} = 3.2$ .

$$\text{So } 4 - \sqrt{b} = 4 - 3.2 = 0.8.$$

(Notice that you don't really have to deal with the root!)  
(Chapter 8, Lesson 1: Solving Equations)

16. **5** If there are  $a$  adults, there must be  $30 - a$  children, because the total number of people is 30.

$$\begin{array}{ll} \text{Therefore} & 10a + 5(30 - a) = 175 \\ \text{Distribute:} & 10a + 150 - 5a = 175 \\ \text{Simplify:} & 5a + 150 = 175 \\ \text{Subtract 150:} & 5a = 25 \\ \text{Divide by 5:} & a = 5 \end{array}$$

Now check: if there are 5 adults, there must be 25 children, and the tickets would cost  $5(10) + 25(5) = 50 + 125 = 175$  (yes!).

(Chapter 8, Lesson 7: Word Problems)

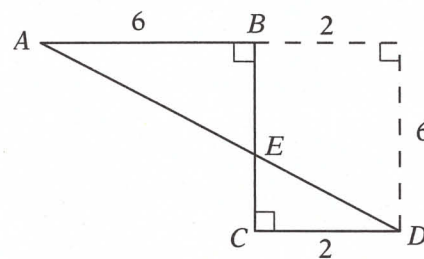
17. **9** Since  $a = (2/3)b$ , the perimeter of the triangle is  $b + b + (2/3)b = (8/3)b$ . The perimeter is 24, so

$$(8/3)b = 24$$

$$\text{Multiply by } 3/8: \quad b = 9$$

(Chapter 10, Lesson 5: Areas and Perimeters)  
(Chapter 7, Lesson 4: Ratios and Proportions)

18. **10**



Mark the diagram with the given information. The dotted lines show that  $AD$  is the hypotenuse of a right triangle with legs of length 8 and 6. So to find it, just use the Pythagorean theorem:

$$6^2 + 8^2 = (AD)^2$$

$$\text{Simplify:} \quad 100 = (AD)^2$$

$$\text{Take the square root:} \quad 10 = AD$$

(Chapter 10, Lesson 3: The Pythagorean Theorem)  
(Chapter 10, Lesson 5: Areas and Perimeters)