What to Expect on the ISEE
ERB's Official Practice Test

Answer Explanations

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Contents

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Verbal Reasoning - Synonyms

1. INITIAL = existing or occurring at the beginning

A. first	B. mutual	C. orderly	D. proper
coming before all others in time or order	held in common by two or more parties	neatly and methodically arranged	suitable or appropriate

2. MANNEQUIN = a dummy used to display clothes in a store window

A. actor	B. aide	C. leader	D. model
one who performs a role in TV, movies, or on stage	one who assists someone of importance	one who commands a group or organization	one employed to display clothing

3. AGENDA = a plan of things to be done or problems to be addressed

A. accident	B. composition	C. duty	D. program
event that happens by chance	the way in which something is made up	moral or legal obligation; responsibility	a planned series of future events

4. ADVERSARY = one's opponent in a contest, conflict, or dispute

A. agent	B. coward	C. opponent	D. rascal
one who acts on behalf of another	one who lacks courage to endure unpleasant things	one who competes or fights another	mischievous or cheeky person

5. PERSONIFY = represent or embody a (usually human) quality, concept, or thing in physical form

A. argue	B. fulfill	C. replace	D. represent
exchange or express opposing views	bring to completion or reality; carry out	take the place of something	be a symbol or embodiment of a thing

6. EQUITY = the quality of being fair and impartial

A. fairness	B. harshness	C. humor	D. knowledge
quality of being free from bias or injustice	quality of being disagreeable to senses	quality of being amusing or comic	facts/skills gained by experience or education

7. ANTHOLOGY = a published collection of poems or other pieces of writing

A. agreement	B. collection	C. disease	D. extension
harmony in opinion or feeling	assembly of items, such as written works	condition that impairs normal functioning	continuation; part that is added to prolong

8. OPAQUE = not able to be seen through; not transparent

A. antique	B. clouded	C. exhausted	D. pretentious
belonging to ancient times	made unclear or less transparent	very tired; completely used up	acting greater than one is to impress others

9. PALPABLE = able to be touched or felt; clear to the mind or plain to see

A. docile	B. political	C. sluggish	D. tangible
submissive; ready to accept control	interested in or active in politics	slow-moving or inactive	perceptible by touch; clear and definite; real

10. FATHOM = understand (a difficult problem or an enigmatic person) after much thought

A. comprehend	B. hasten	C. question	D. trick
grasp mentally; understand	cause to happen sooner than normal	feel or express doubt about something	deceive or outwit through cunning/skill

11. DIMINISH = make or become less; make seem less impressive or valuable

A. eliminate	B. evade	C. examine	D. reduce
completely remove or get rid of something	escape or avoid; avoid giving a direct answer to	inspect in detail; investigate thoroughly	make smaller or less in amount, degree, or size

12. PERPETUATE = make a thing (undesirable situation or unfounded belief) continue indefinitely

A. continue	B. convince	C. enclose	D. introduce
persist in an activity or process	cause one to believe firmly in a truth	surround or close off on all sides	bring into use/operation for first time

13. ADMONISH = warn or reprimand someone firmly

A. delay	B. organize	C. suffer	D. warn
make something late or slow	arrange into a structured whole	experience something bad or unpleasant	give someone forceful or cautionary advice

14. DEPICT = show or represent by a drawing, painting, or other art form

A. describe	B. discard	C. include	D. reverse
give an account in words of something	get rid of something as no longer useful/wanted	make part of a whole or set	move backward; make opposite of what is

15. EPITOME = a person or thing that is a perfect example of a particular quality or type

A. embodiment	B. equilibrium	C. resilience	D. viewpoint
a tangible form of an idea, quality, or feeling	a state of physical or mental balance	capacity to recover quickly from difficulties	way of considering/one's position on a matter

16. TRANSITORY = lasting only for a short time

A. active	B. essential	C. fleeting	D. immediate
ready to engage in energetic pursuits	absolutely necessary; extremely important	lasting for a very short time	occurring or done at once; instant

17. INCITE = encourage or stir up (usually violent or unlawful behavior)

A. explain	B. investigate	C. provoke	D. request
make something more clear through description	carry out inquiry to establish truth	stimulate a reaction or emotion (unwelcome)	politely or formally ask for something

Verbal Reasoning - Sentence Completions

18. Poet-novelist Rita Dove, former United States Poet Laureate, was the <u>recipient</u> of the 1966 Heinz Award in the category of arts and humanities.

D

Explanation	Working with the information provided by the sentence, Dove writes poetry and novels (both works of arts/humanities) and was the United States Poet Laureate. You do not have to know what a Poet Laureate is, but you can recognize the fact the title includes "United States," which indicates that Dove was a very important poet throughout the whole of the United States. Thus, it makes sense that such an important poet would receive an award for her efforts. Plus, we would need more information for the other answer choices to be true (did she make or bring about the award?)

19. Alfred Jarry's first play, *Ubi Roi*, is considered the first work of the theater of the absurd; although it caused a scandal when it opened in 1896, today it is <u>acclaimed</u> for its innovative plot.

A

Explanation	Focusing on the parts of the sentence that follow the semicolon, the contextual structure shifts from negative to positive. While "scandal" puts the play in a negative light, the "although" marks a shift from "scandal," and "innovative" suggests the play was well received. Thus, "acclaimed" (praised enthusiastically and publically) makes the most sense.

20. Many people raise their voices in an argument, as though higher volume <u>provides</u> a greater ability to persuade.

C

Explanation	"as though" indicates that second part of the sentence is the reason for the first part—raised voices help with persuasion in an argument. Thus, "provides" makes the most sense. The sentence does not discuss a second aspect of volume or argument for "balances" to make sense (low volume or fighting, for example, is not mentioned). "necessitates" does not work because "a greater ability to persuade" is the reason for "higher volume" and not its consequence.

21. In the second half of the nineteenth century, the number of American bison, which were once <u>abundant</u>, began to decline as the bison became a source of food for westward-moving pioneers and railroad workers.

A

Explanation	Boiled down, the sentence states the number of bison declined. However, "which were once" indicates the number of bison were something else before the decline. We want an answer choice that means the bison were great in number or were something greater than before their decline. Thus, "abundant" (existing or available in large quantities) makes the most sense. "vibrant" means "full of energy and enthusiasm," which tells us nothing about the number of bison before their decline (just that they had great personalities).

22. Unlike other great apes, which are social, orangutans are <u>solitary</u> creatures except for playful juveniles and mothers with babies.

D

Explanation	The sentence defines great apes as social things, and the "Unlike" indicates that orangutans are the opposite of social. We want an answer choice that means the opposite of wanting to interact with others, like the juveniles and mothers with babies. Thus, "solitary" (wanting to act alone) makes the most sense. We do not have enough information in the sentence to say whether or not other great apes are unhappy ("contented") or strange ("mysterious"), and "friendly" has a similar meaning to "social."

23. The article on gene splicing was so <u>esoteric</u> that only a handful of the students were able to understand it.

B

Explanation	If only a small portion of a group of people understand something, then that something is difficult or above the heads of most. While you may not know the definition of "esoteric," you likely know the definition of the other answer choices. "contrite" means to show or feel remorse (feeling guilty). If the article were "functional," then more people would understand it. There is not enough information in the article to determine if the truth ("genuine") of the article would help make it more understandable. Thus, our only possible answer is "esoteric" (only understood by a few people).

24. The first African American actor to attain international <u>renown</u> was Ira Aldridge, one of the leading Shakespearean performers of the 1800s.

D

Explanation	Ira Aldridge is a leading performer, which indicates that she is important (a positive connotation). We want an answer choice that means Ira attains something good regarding the international community. Thus, "renown" (fame) makes the most sense, since "rejection" is negative. International "permanence" does not make sense (what is becoming permanent? Her fame or infamy?), and we would need to know what Ira is "provoking" internationally (good or bad things?).

25. Ancient cave paintings of the sun, the moon, and wild animals <u>testify</u> to the inherent human desire and ability to portray the environment.

D

Explanation	The sentence states that humans want and are able to draw or portray their environment, as evidenced or shown by the paintings. You might think that "cater" makes the most sense, since it refers to trying to satisfy a particular need or demand. However, the blank is the subject's verb—the paintings' verb. The humans create the paintings to satisfy their desire, but that is not the action taking place in the sentence. Instead, the action is the existence of the paintings show or "testify" to this inherent desire.

26. Each afternoon the shepherd would drive his flock along the narrow road, effectively <u>obstructing</u> the way for an hour.

A

Explanation	The sentence stipulates that the road is "narrow," which is enough information for us to determine that a flock of sheep would block "the way" for an hour. Thus, "obstructing" (blocking) makes the most sense. We would need more information to determine if the sheep/shepherd were "plundering" (stealing) items from the road. If the flock were "renouncing" (declaring abandonment of something) the road for only an hour, it's not much of a renouncement. We would need much more information for "transplanting" (move or transfer something to another place) to make any sort of sense.

27. The city council looked at the proposal for a new library with an indifference that bordered on <u>scornfulness</u>.

C

Explanation	The important word in this sentence is "indifference" (lack of concern, interest, or care). Because the city council does not care about or have any interest in the proposal, the direction that indifference "borders" on must make sense. Nothing in the sentence suggests anything that would make the council interested in the proposal. Thus, "scornfulness" (deep contempt for something) makes the most sense.

28. The art of Frida Kahlo was strongly <u>influenced</u> by her lifelong interest in and <u>fascination</u> with Mexican folklore and culture.

B

Explanation	The conjunction "and" between "lifelong interest" and the second blank indicates that the second blank mimics the positive context of "lifelong interest." If Kahlo's relationship with Mexican folklore and culture is positive, then the affect it has on Kahlo's art is also positive. "irritation," "repelled," and all of answer choice D are negative. Thus, "influenced" and "fascination" makes the most sense.

29. Like most other <u>chronic</u> medical conditions, arthritis is not curable; physicians do their best, however, to <u>ameliorate</u> its symptoms.

A

Explanation	"not curable" shows that arthritis does not end, and the first blank is a word that means this fact. "temporary" is the complete opposite of what we want, and "complicated" has no bearing on whether or not something will ever end. If a medical condition is "imaginary," it never existed in the first place. Thus, "chronic" is the only answer that makes sense for the first blank. If you want to make sure A is the best answer, you can look to the relationship between "physician" (a healer) and the second blank. Even if something isn't curable, a physician will want to help a sick person as much as possible. A physician would not want to "mimic" (imitate) or "extend" (cause to last longer) arthritis's symptoms. A physician would want to "minimize" (reduce to the smallest amount or degree) the symptoms, but we already established that "imaginary" doesn't work.

30. Although much of the worst pollution has been eliminated in the United States, traces of many toxic chemicals still persist.

B

Explanation	"Although" indicates that the second blank will be the opposite in some way of the first blank. Plus, the combination of "traces" (small amounts) and "still" shows that the pollution is continuing something in some way. Thus, if the pollution is continuing, the first blank is a word for stopping or ending. Only "eliminated" fits this description, and "persists" means "to stubbornly continue against all odds." Also, Answer choice B is the only option with opposing meanings.

31. Queen Victoria had mixed opinions on the emancipation of women; while she fostered education for women, she opposed their right to vote.

C

Explanation	"mixed opinions" indicates that the two blanks will be opposing in meaning—whatever she wants for women's education, it will be the opposite for women's voting rights. Answer choices A, B, and D are complimentary in meaning some way and context, but answer choice C has opposing words—"fostered" (promote the development of) and "opposed" (disapproved).

32. The casual observer of a lichen growing on a rock would never suspect that it was a composite of life-forms interacting with one another.

A

Explanation	Although this is a two-blank sentence, we really only need the word for the first blank. An observer that would never suspect something is one who is not looking carefully at things. An "inquiring" (showing an interest in learning new things) would want to thoroughly observe the lichen on the rock, while an "expert" or "knowledgeable" observer would already know the second part of the sentence or what to look for. Thus, our only option is a "casual" (relaxed or unconcerned) observer in answer choice A. You can check your answer with "composite" (made up of various parts and elements), but it also is the only word that works for "interacting with one another."

33. If the authors had written with more restraint and avoided such sentimental language, their articles would have had more power.

D

Explanation	The conjunction "and" between the first blank and "avoided" indicates that the first blank mimics the relative meaning of "avoided." Plus, "would have had more power" indicates that the second blank is a negative adjective for "language." Both answer choices A and B have positive words and do not match what we need. While "excess" matches the negative context that we need, it does not mimic the meaning of "avoided." Thus, "restraint" (self-control) and "sentimental" (sad in an exaggerated way) make the most sense—if the authors had restrained their language, they would have avoided losing power.

34. Despite the apprehension I felt at the thought of meeting Luisa, our business was transacted in an atmosphere that was clearly congenial.

A

Explanation	"Despite" indicates that the first blank is opposing in meaning and context to the second blank—if the first blank is negative, then the second blank must be positive. Only answer choice A has words that oppose in meaning and context. Answer choices B and C have words that are both positive, while answer choice D has words that are negative. Thus, "apprehension" (fear that something bad will happen) and "congenial" (pleasant or agreeable) make the most sense.

35. Because the caretaker had led a frugal lifestyle for most of his life, his million dollar bequest to the settlement house amazed the trustees.

A

Explanation	"Because" and "amazed" indicate that the first blank will oppose in meaning and context to the second blank in some way. If the caretaker led a "lavish" (very generous or extravagant) lifestyle, then a million dollar "generosity" would not amaze the trustees—not to mention the fact this would be an improper use of generosity as an actual object and not a quality. If the caretaker led a "generous" lifestyle, any sort of "legacy" (amount of money or property left to someone) would not amaze the trustees. We would need more information for what a "unique" lifestyle is and why a "million dollar entreaty" ("entreaty" = humble request) would amaze the trustees for answer choice D to work. Thus, "frugal" (sparing or economical with food or money) and "bequest" (legacy or endowment) makes the most sense.

Quantitative Reasoning

1. 35 — A

Tools: function notation

Steps: (1) n^* is just like $f(x)$, in that you input a specific value for n for the function (equation) $n^* = 4n + 3$ (the input is multiplied by 4 and then added to 3)
(2) In this case, 8 is our specific value → $n^* = 4n + 3 \rightarrow 4(8) + 3$
(3) $4(8) + 3 \rightarrow 32 + 3 = 35$

Quick Tips:
- Function notation can come in many forms and with multiple variables
- Example: $n \blacksquare o \blacksquare p = n + o + p \rightarrow 4 \blacksquare 5 \blacksquare 6 = 4 + 5 + 6$

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2. $x - 3$ — B

Tools: balancing equations

Steps: (1) In order to find which expression is equal to y, we must get y by itself in the given equation
(2) $x - y = 3 \rightarrow -y = 3 - x \rightarrow -y = -x + 3$
(3) Since $-y$ is not the same thing as y, we need to make $-y$ positive by multiplying both sides by –1
(4) $(-1)(-y) = -1(-x + 3) \rightarrow y = x - 3$

Quick Tips:
- Pay close attention to your signs as your balance the equation
- Remember, you must perform the same operation to both sides of an equation to keep it balanced

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3. $x - 1{,}999$ — A

Tools: algebra word problem, integers

Steps: (1) We are given the sum of all integers from 1 to 1000 as x, which can be written as $1 + 2 + 3 \ldots + 998 + 999 + 1000 = x$
(2) You can also write out the sum of all integers from 1 to 998 in a similar manner: $1 + 2 + 3 \ldots + 996 + 997 + 998 = ?$
(3) Notice the difference between the two equations: the first equation includes all integers from 1 to 998, and then adds 999 and 1000 to achieve x
(4) Thus, the second equation is simply missing the values 999 and 1000 (missing can be a translation of subtracting)
(5) If the sum of the first equation is x, then we can subtract 999 and 1000 from x to achieve the sum of all integers from 1 to 998
(6) $1 + 2 + 3 \ldots + 998 + 999 + 1000 = x \rightarrow 1 + 2 + 3 \ldots + 998 = x - 1000 - 999$
(7) $x - 1000 - 999 \rightarrow x - 1999$

Quick Tips:
- Write out all information to the side of the word problem so that it is separate from the text

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4. 12% — D

Tools: percent of change, triangles

Steps: (1) While we are not given any values, we can still find the answer
(2) Choose a value for the triangle's height and base that is easy to manipulate with percentages (such as 10 or 100 for both)

(3) Using 10 for both measurements, the area of the triangle is 50 ($\frac{10\times10}{2} = 50$)
(4) Increase the height by 10%: $10 + (10\times0.1) = 10 + (1) = 11$
(5) Decrease the base by 20%: $10 - (10\times0.2) = 10 - (2) = 8$
(6) Find the new triangle's area: $(11\times8) \div 2 = (88) \div 2 = 44$
(7) Use the percent of change formula: $P = \frac{|Original-New|}{Original}$
(8) $P = \frac{|50-44|}{50} = \frac{6}{50} \rightarrow \frac{12}{100} \rightarrow 12\%$

Quick Tips:
- Percentages will work for whatever values you choose for the original triangle
- It is easier to convert fractions with a denominator of 100 to percentages (in this case we multiplied the denominator and numerator by 2)

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5. 14 B

Tools: multiplying polynomials, balancing equations
Steps: (1) Start with the left side of the equation by squaring $x + 7$ and follow FOIL
(2) $(x + 7)^2 \rightarrow (x + 7)(x + 7)$
(3) First: $(x)(x) = x^2$
(4) Outside: $(x)(7) = 7x$
(5) Inside: $(7)(x) = 7x$
(6) Last: $(7)(7) = 49$
(7) $x^2 + 7x + 7x + 49 \rightarrow x^2 + 14x + 49$
(8) Now, look at the placement of 14 and m in $x^2 + 14x + 49 = x^2 + mx + 49$
(9) If you remove similar elements from both sides, $14 = m$ remains

Quick Tips:
- If you are unfamiliar with FOIL, you can also use the distributive property
- $(x + 7)(x + 7) \rightarrow x(x + 7) + 7(x + 7) \rightarrow x^2 + 7x + 7x + 49 \rightarrow x^2 + 14x + 49$

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6. 91.00 C

Tools: mean, multiples
Steps: (1) Find the sum of 370 and 85, and then divide by the number of tests (5)
(2) $370 + 85 = 455$
(3) $455 \div 5 = 91$

Quick Tips:
- Since 370 and 85 are multiples of 5, their sum will also be a multiple of 5
- The result of dividing a multiple of 5 by 5 can only be an integer, so answer choices B and D cannot be true

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7. 42 inches C

Tools: perimeter, whole numbers
Steps: (1) Since the measurements are in whole numbers, we can look to the factors of 110 to find our measurements
(2) $110 \rightarrow 1, 2, 5, 10, 11, 22, 55, 110$
(3) We can quickly eliminate the perimeters of 1 and 110 and 2 and 55
(4) If we use 5 and 22, the perimeter is 54 inches, answer choice D
(5) However, if we use 10 and 11, the perimeter is 42

Quick Tips:
- Since the measurements are whole numbers, answer choices A and B cannot be true since the sum of all 4 sides of a rectangle will be an even number
- The sum of two even numbers is an even number

- The sum of two odd numbers is an even number

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8. Answer choice A's graph **A**

Tools: analyzing charts and graphs, temperature

Steps: (1) Since the potato starts out cool, answer choices B and C do not work because they place the potato above 300° before any time has elapsed
(2) Since the oven is set to 350°, the potato cannot go above that temperature as in answer choice D
(3) Only answer choice A accurately portrays the cooking of the potato over time

Quick Tips:
- Pay close attention to the information provided by the word problem
- "cool potato" and "hot (350°) oven" give us our parameters for the problem

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9. 6 cm **B**

Tools: similar triangles

Steps: (1) Because the triangles are similar, they share the same degree values and proportional side lengths
(2) If you look to side lengths QR and TU, you'll notice that QR is increased by $\frac{3}{2}$ to achieve $\frac{3}{2}x$; thus, our proportion is $\frac{3}{2}$ for the triangles
(3) Multiply the side length of QS by $\frac{3}{2}$ to find the length of TV
(4) $4\times\frac{3}{2}=\frac{12}{2}=6$ cm

Quick Tips:
- Similar triangles have the same degree values and proportional side lengths
- Congruent triangles have the same degree values and side lengths

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10. 1 **B**

Tools: exponents, distributive property

Steps: (1) The fastest way to solve this question is by changing all values into terms of 3
(2) $9\rightarrow 3^2$; therefore, $\frac{3(3^2+3^3)}{3^2(3+3^2)}$
(3) Following the distributive property, you'll notice that the same thing is happening in the numerator and the denominator $\frac{3(3^2+3^3)}{3^2(3+3^2)}\rightarrow\frac{3^3+3^4}{3^3+3^4}=1$
(4) The result of a number divided by itself is always 1
(5) You can also multiply everything out (reduce where you can to make it easier)
(6) $\frac{3(3^2+3^3)}{9(3+9)}\rightarrow\frac{1(9+27)}{3(12)}\rightarrow\frac{1(36)}{3(12)}\rightarrow\frac{1(3)}{3(1)}\rightarrow 1$

Quick Tips:
- Answer choice A can be quickly eliminated because no part of the expression will result in 0
- In many cases, you do not need to multiply everything out to arrive at your answer

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11. 0.25 miles **A**

Tools: analyzing charts and graphs

Steps: (1) Since we are looking for the point during Jane's walk where she waited for her friend, we need to find a spot on the graph where the distance from Jane's

home remains the same but the time still increases
(2) The values on the *x*-axis and *y*-axis are the same, but the *x*-axis is clearly marked as time while the *y*-axis is marked as distance
(3) At the first half-hour mark, Jane's distance is 0.25 miles from her home
(4) Notice that this distance stays at 0.25 miles from 0.50 hours to a little before the 0.75 hour mark—this is the only time something like this happens
(5) Thus, the only possible conclusion is Jane was 0.25 miles from her home when she waited for her friend

Quick Tips:
- Since the question is looking for a point where one value does not increase, you can quickly observe that this only occurs at one point for the whole graph
- Pay close attention to the designations for the axes

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12. range D

Tools: mean, median, mode, range

Steps:
(1) Much of the information in this problem is superfluous (unnecessary)
(2) Think about how the mean, median, mode, and range will be affected by adding 6 points to every score
(3) The mean, median, and mode would change in some way, but focus on the range (the difference between the lowest and highest value in a data set)
(4) If the highest score is a 100, then the lowest score is a 36 (range of 64)
(5) If you increase both of those scores by 6 points, the highest score would be 106 and the lowest would be 42
(6) The range will still be 64 with the point increase; thus, the range changes the least

Quick Tips:
- Confirm what the question is looking for before writing out information to the side of the problem (you'd save yourself some time)
- Keep in mind the definitions of concepts in the Quantitative Reasoning section since some of the questions are testing that knowledge

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13. Maud B

Tools: probability

Steps:
(1) For probability, it is important to understand the operation that occurs for events with words like "or"
(2) The "or" means that the probability of rolling a sum of 6 points is added to the probability of rolling a sum of 4 points for Maud, giving her the greater probability of receiving a point
(3) Jim only has the first probability, while Maud has both (giving her the edge)
(4) The probability of rolling a sum of 6 points is $\frac{5}{36}$ and the probability of rolling a sum of 4 points is $\frac{3}{36}$; $\frac{5}{36} + \frac{3}{36} = \frac{8}{36}$
(5) Jim: $\frac{5}{36} < \frac{8}{36}$: Maud

Quick Tips:
- You do not need to know the actual probabilities to answer this question
- The fact that Jim and Maud receive a point for the first probability but Maud also receives a point for the second probability is all the information we need

14. 14 D

Tools: mean, median, range, symmetry, analyzing charts and graphs

Steps:
(1) The median (or middle) of the data is 7 (the tallest bar on the graph)
(2) The mode (or value that appears the most) of the data is also 7
(3) If the data is symmetrical (one half is the same as the other half) about the value of 7, then the frequency of the values on the left side of the value of 7 will be mirrored for the values on the right side of the value of 7 (the bars will look like a triangle)
(4) The range (difference between the lowest and highest value) of the data is 8 and the maximum value is 11, which means the lowest value is 3
(5) We want the number of data points (total number of frequency) that fall above the value of 7, which are the data points for the values of 8, 9, 10, and 11
(6) Since the left of 7 is mirrored on the right, the bar for 6 is the same for 8 and the bar for 5 is the same for 9
(7) Counting each point of frequency, 8 has 7 points, 9 has 4 points, 10 has 2 points, and 11 has 1 point
(8) $7 + 4 + 2 + 1 = 14$

Quick Tips:
- This question is the most convoluted question on this practice test, and most students have trouble with it
- You can write all over your test booklet on the real ISEE (do so!)

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15. 9 C

Tools: functions, compound inequalities

Steps:
(1) The compound inequality is stating that the smallest value for *x* is –2 and the largest value for *x* is 1
(2) Input these two values to find *y* (most start with 1 since it is the largest)
(3) $y = 2x^2 + 1 \rightarrow 2(1)^2 + 1 \rightarrow 2 + 1 \rightarrow y = 3$
(4) $y = 2x^2 + 1 \rightarrow 2(-2)^2 + 1 \rightarrow 2(4) + 1 \rightarrow 8 + 1 \rightarrow y = 9$

Quick Tips:
- You can input the answer choices for *y* and solve for *x* to find the answer
- Answer choice D is achieved by inputting $\sqrt{8}$, which is not a possible value of *x*, since $\sqrt{8}$ is approximately ± 2.8
- Answer choice A is achieved by inputting 0

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16. $g(0.9) < f(0.9) < f(1.1) < g(1.1)$ B

Tools: radicals, exponents

Steps:
(1) While you are not allowed a calculator on this test, you don't need to know the exact results for each of the inputs of 0.9 and 1.1 into functions $f(x)$ and $g(x)$, which take the square root of the input and square the input respectively
(2) If you square a positive decimal number that is less than 1, such as 0.9, then the result will be less than before ($0.9^2 = 0.81$)
(3) If you take the square root of a positive decimal number that is less than 1, such as 0.9, then the result will be greater than before ($\sqrt{0.9} \approx 0.95$)
(4) The opposite is true for a decimal number that is greater than 1, such as 1.1, where $1.1^2 = 1.21$ and $\sqrt{1.1} \approx 1.05$
(5) $0.9^2 < \sqrt{0.9} < \sqrt{1.1} < 1.1^2$

Quick Tips:
- Consider $\sqrt{1}$ and 1^2 to recognize how 0.9 and 1.1 will play out with $\sqrt{x}$ and x^2

17. the difference in John's and Erin's speeds — D

Tools: distance, rate, and time

Steps:
(1) Note that John and Erin run at a constant rate and on the same path
(2) John is 500 meters ahead of Erin when she starts to run, and John will maintain his constant rate the whole time Erin is attempting to catch up
(3) If John and Erin are both running at 20 meters per minute, then Erin will forever remain 500 meters behind
(4) If John is running 20 meters per minute and Erin is running 25 meters per minute, Erin in will be able to catch up in 100 minutes ($t = \frac{d}{r} \rightarrow t = \frac{500}{5} = 100$)
(5) If we know the difference in John and Erin's speeds, then we can determine how long it will take Erin to catch up to John

Quick Tips:
- Input easy values for each variable in a word problem to test out information to see what would be true
- Multiples of 5 or 10 work well for input

---

18. answer choice A's figure — A

Tools: geometric patterns

Steps:
(1) Note that the cube has a circle with one triangle pointing away from it and the other triangle pointing to it
(2) Folded over, answer choice B would have the pattern △○△
(3) Folded over, answer choice C would have the pattern ▽○▽
(4) Folded over, answer choice D would have both triangles pointed away from the circle
(5) Only answer choice A would have the pattern of one triangle pointing away from the circle and the other triangle pointing to the circle when folded over

Quick Tips:
- Answer choice A is the only pattern with a triangle pointing towards the circle, so the other answer choices do not work

---

19. The two quantities are equal — C

Tools: order of operations

Steps:
(1) All we need to do is find the value of the quantity under Column A (Column B is already simplified)
(2) Follow the order of operations: $5 + 2\times(4 + 3) \rightarrow 5 + 2\times(7)$
(3) $5 + 2\times(7) \rightarrow 5 + 14 \rightarrow 19$
(4) $19 = 19$

Quick Tips:
- Many students miss this question because they add 5 and 2 first and then multiply that product to the sum of 4 and 3—don't forget the proper order!

---

20. y is the greater value — B

Tools: area, perimeter, algebraic equations

Steps:
(1) Since the area of rectangle Q is 18 cm^2, we can find x by using the formula for the area of a rectangle ($A = lw$)
(2) $(2x)(x) = 18 \rightarrow 2x^2 = 18 \rightarrow x^2 = 9 \rightarrow x = 3$
(3) Since the perimeter of rectangle R is 30 cm, we can find y by using the formula for the perimeter of a rectangle ($P = 2l + 2w$)

(4) $2(2y) + 2(y) = 30 \rightarrow 4y + 2y = 30 \rightarrow 6y = 30 \rightarrow y = 5$
(5) $3 < 5$

Quick Tips:
- As soon as you see information regarding "area" or "perimeter," quickly jot down the appropriate formulas for those concepts

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21. The two quantities are equal **C**

Tools: multiplying polynomials

Steps:
(1) There is nothing to be done with Column B, so we can focus on Column A
(2) Use the distributive property to correctly multiply the polynomials
(3) $(x - y)(x^2 + xy + y^2) \rightarrow x(x^2 + xy + y^2) - y(x^2 + xy + y^2)$
(4) $x(x^2 + xy + y^2) - y(x^2 + xy + y^2) \rightarrow x^3 + x^2y + xy^2 - x^2y - xy^2 - y^3$
(5) $x^3 + x^2y + xy^2 - x^2y - xy^2 - y^3 \rightarrow x^3 + \cancel{x^2y} + \cancel{xy^2} - \cancel{x^2y} - \cancel{xy^2} - y^3 \rightarrow x^3 - y^3$
(6) $x^3 - y^3 = x^3 - y^3$

Quick Tips:
- You could also input 1, 0, and –1 as values for both *x* and *y* to test them, but doing so might actually take you longer than simply multiplying Column A

---

22. $3.00 is the greater value **B**

Tools: substitution in linear equations

Steps:
(1) Create an equation for the sum of the value of dimes and quarters in the parking meter: $0.10d + 0.25q = \$4.50$
(2) If there are twice as many dimes as there are quarters in the parking meter, then we can show *d* as $2q$ $(d = 2q)$
(3) Now, substitute $2q$ for *d* in the first equation: $0.10d + 0.25q = 4.50 \rightarrow 0.10(2q) + 0.25q = 4.50$
(4) Solve for *q*: $0.10(2q) + 0.25q = 4.50 \rightarrow 0.20q + 0.25q \rightarrow 0.45q = 4.50$
(5) $0.45q = 4.50 \rightarrow q = 10$ quarters
(6) The total value of the quarters in the meter is $2.50 (or 0.25×10)
(7) $\$2.50 < \$3.00$

Quick Tips:
- In the first equation, you cannot simply add *d* to *q* and set it equal to 4.50—the number of items does not equate to $4.50, but the value of the items times the number of the items does (10 quarters at $0.25 each plus 20 dimes at $0.10 each makes $4.50)

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23. The slope of line *k* is the greater value **A**

Tools: parallel lines, slope of linear equations

Steps:
(1) If a line is parallel to another line, then their slopes are equal
(2) The slope of line *j* is 3 ($y = mx + b$; where *m* is the slope and $m = 3$)
(3) $3 > -3$

Quick Tips:
- Notice that the lines are at an incline; thus, their slopes must be positive
- Any positive value is greater than a negative value—even if you weren't given the equation for line *j* you could find the answer with this knowledge alone

24. The relationship cannot be determined from the information given **D**

Tools: perimeter, area

Steps:
(1) While we are not given any values for the length and width of the rectangle, we can test some possibilities by using the formulas for perimeter ($P = 2l + 2w$) and area ($A = lw$)
(2) If the length is 10, then the width would be 15: $2(10) + 2w = 50 \rightarrow 20 + 2w = 50 \rightarrow 2w = 30 \rightarrow w = 15$
(3) The area of these dimensions would be 150: $(10)(15) = 150$
(4) In this case, Column A is greater
(5) If the length is 5, then the width would be 20: $2(5) + 2w = 50 \rightarrow 10 + 2w = 50 \rightarrow 2w = 40 \rightarrow w = 20$
(6) The area of these dimensions would be 100: $(5)(20) = 100$
(7) In this case, Column B is greater
(8) Because our answers change, the only possible solution is answer choice D

Quick Tips:
- When inputting values, if your answer changes from one case to the next, then the relationship cannot be determined (more concrete information is needed)

---

25. Area of the shaded region is the greater value **A**

Tools: area, operations on algebraic expressions

Steps:
(1) Find the area of the larger square as if the small cut out is not there
(2) $(x)(x) = x^2$
(3) Find the area of the cut out
(4) $(y)(y) = y^2$
(5) Subtract the area of the cut out from the area of the larger square
(6) $x^2 - y^2$
(7) If $x > 0$ and $y > 0$, then *x* and *y* are positive values
(8) Input 2 for *x* and 1 for *y* to test Column A and B
(9) $x^2 - y^2 \rightarrow (2)^2 + (1)^2 = 4 + 1 = 5$ vs. $x^2 - xy - y^2 \rightarrow (2)^2 - (2)(1) - (1)^2 \rightarrow 4 - 2 - 1 = 1$ (this will be true for all inputs)

Quick Tips:
- Note that the quantity under Column B is generally the same as Column A except that an additional term is subtracted from x^2
- Since we know both *x* and *y* are positive values, we can safely conclude that an additional positive value is subtracted from the quantity under Column B, making Column A larger in all instances

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26. 10 is the greater value **B**

Tools: integers, consecutive numbers

Steps:
(1) Although we don't need to do anything with Column B, we can still use it's quantity to determine the value of the quantity in Column A
(2) If we assume that greatest of the 3 consecutive integers is 10, we can find the product of the 3 integers and compare that the product of the actual 3 consecutive integers
(3) If 10 is the greatest integer, then it would be $8 \times 9 \times 10 = 720$
(4) 720 is much larger than 210, which means that the greatest integer for Column A cannot be greater or equal to 10 (it must be a smaller integer)
(5) Incidentally, the consecutive integers are 5, 6, and 7 ($5 \times 6 \times 7 = 210$)

Quick Tips:
- It would be very challenging to try to find the solution algebraically

- $x(x+1)(x+2) \rightarrow (x^2+x)(x+2) \rightarrow x^2(x+2)+x(x+2) \rightarrow x^3+2x^2+x^2+2x \rightarrow x^3+3x^2+2x = 210$ (Good luck solving this in a timely manner!)

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27. $25n - 1$ is the greater value — A

Tools: order of operations

Steps:
(1) Although we are not given any values for *n*, we cannot assume the answer is D
(2) Instead, test your own inputs for *n* (1, 0, and –1 to start)
(3) If $n = 1$, then A is $25(1) - 1 = 24$ and B is $25(1-1) = 0$; $24 > 0$
(4) If $n = 0$, then A is $25(0) - 1 = -1$ and B is $25(0-1) = -25$; $-1 > -25$
(5) If $n = -1$, then A is $25(-1) - 1 = -26$ and B is $25(-1-1) = -50$; $-26 > -50$
(6) In all cases, Column A is greater than Column B and will remain true for all other inputs

Quick Tips:
- Remember, if you aren't given any values for variables, input simple to calculate values (2, 1, 0, -1, and -2)

---

28. The relationship cannot be determined from the information given — D

Tools: perimeter

Steps:
(1) It may seem like we're given a decent amount of information, but you'll quickly see we really need to have some parameters for *x* and *y* to solve this one
(2) If $x = 1$ and $y = 2$, then A is 3 and B is 6
(3) If $x = 2$ and $y = 1$, then A is 6 and B is 3
(4) Because our answers changed, the only possible solution is D

Quick Tips:
- When inputting values, if your answer changes from one case to the next, then the relationship cannot be determined (more concrete information is needed)

---

29. The two quantities are equal — C

Tools: probability

Steps:
(1) While it may seem like the first part of each statement under Column A and Column B matter, the roll of a number cube has no bearing on the probability of a coin landing heads or tails up (these events are independent)
(2) If an event is independent of another event, then there is no correlation (connection) to the events' probabilities
(3) Thus, the real quantity under Column A is the probability of the coin landing tails up or $\frac{1}{2}$
(4) The real quantity under Column B is the probability of the coin landing heads up or $\frac{1}{2}$
(5) $\frac{1}{2} = \frac{1}{2}$

Quick Tips:
- Independent events do not influence each other's probabilities (a die is cast and a coin flipped)
- Dependent events do influence each other's probabilities (2 marbles are removed from a bag—the probability of both being red)
- Mutually exclusive events cannot happen at the same time (coin landing heads and tails up)

30. The median score is the greater value — A

Tools: median, range, analyzing charts and graphs

Steps:
(1) You could spend a great deal of time finding the actual median for the graph, but it is faster to find the range and compare that to a possible median
(2) The highest possible value of this graph is 100 and the lowest possible value is 51
(3) The range is the difference between these two values: $100 - 51 = 49$
(4) The range of this graph is 2 less than the lowest possible exam score on this graph; thus, the range cannot be greater than the median (middle value) of this graph

Quick Tips:
- If a question seems like it will take a long time to determine something, like the median of this graph, then there is likely a more simple way to solving the problem
- Pay close attention to what the question is looking for and keep in mind the definitions for range, median, mode, and mean

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31. The probability that the first candy selected is green is the greater value — B

Tools: probability

Steps:
(1) Since there are 5 candies, we can determine that for a single selection the probability of selecting an orange candy is $\frac{2}{5}$ and a green candy is $\frac{3}{5}$
(2) Column B is probability of selecting a green candy on the first draw or $\frac{3}{5}$
(3) Column A is the probability of selecting a green candy, putting it back, and then selecting another green candy (dependent events)
(4) For Column A, we multiply the probability of the first draw ($\frac{3}{5}$) to the probability of the second draw ($\frac{3}{5}$)
(5) $\frac{3}{5} \times \frac{3}{5} = \frac{9}{25}$
(6) $\frac{9}{25} < \frac{3}{5}$

Quick Tips:
- If the events are dependent, then you multiply the probability of each event to each other
- If the first draw is not replaced, then you must reduce the numerator and denominator of the probability accordingly ($\frac{3}{5} \rightarrow \frac{2}{4}$)

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32. \$1.50 is the greater value — B

Tools: algebra word problems

Steps:
(1) Find the increased price of apples in March: $A + (A \times \%) = B$
(2) $1.50 + (1.50 \times 0.10) = 1.50 + (0.15) = 1.65$
(3) Find the decreased price of apples in April from March's price
(4) $1.65 - (1.65 \times 0.10) = 1.65 - (0.165) = 1.485$
(5) $\$1.485 < \$1.50$

Quick Tips:
- Increasing a value by a percentage and then decreasing the resulting value by the same percentage will result in a smaller value than the original value

Reading Comprehension - Passage 1

1. The primary purpose of the passage is to describe a discovery that excited the author's interest.

B

Explanation	The whole of the passage discusses the author's experiment with caddis larvae, from collecting creatures in jars to showing off his experiment's results to his friends. While the passage starts off by mentioning the author's interest in freshwater biology, the passage does not discuss why he is interested in it (answer choice A). The author does not compare the caddis larvae to any other creature (answer choice C) and does not discuss the complete life cycle of the caddis larvae (answer choice D).

2. In line 4, "minute" most nearly means tiny.

C

Explanation	If a creature can fit into a jar, even a large one, then it is small in size. Thus, the author uses "minute" (mī'n(y)o͞ot or my-noot) to mean "tiny" or "extremely small." Even if you do not know this definition of "minute," you do know the measurement of time for which "minute" stands. You know that a minute is a very short or small amount of time, so you can still think of creatures in that general sense. Nothing in the sentence or its surrounding content suggests that the creatures are "timely" (punctual or on-time), "timorous" (nervous or fearful), or "tireless" (never tiring).

3. The author caused the larvae to decorate their cocoons with stripes by changing their environment at various stages of cocoon development.

C

Explanation	Look to the second and third paragraphs. The author first states his friend said, "…that if you remove a caddis larva from its cocoon and place it in a jar of clear water, it would spin itself a new cocoon and decorate the outside with whatever materials you supplied." Then, in the third paragraph, the author states, "I discovered that by moving the larvae to a different jar with a new substance, they would produce new multicolored cocoons." The author moves the larvae from jar to jar (answer choice C). He does not keep the larvae in a single jar throughout the whole process (answer choices A, B, and D).

4. In line 8, the author describes the caddis larvae as "rather dull" because they had been living in a stagnant pool.

C

Explanation	Look to line 7-11, "The caddis I had collected looked rather dull, for I had collected them from a stagnant pool…" The author does not say that the larvae were still in the caterpillar stage or that the larvae were removed from the pool before finishing their cocoons (A and D). While the author does place the larvae into a jar, he does not say that's why the larvae were dull (answer choice B).

5. In the final sentence (lines 33-36), the author suggests that the caddis larvae were annoyed by the author's experiments.

B

Explanation	The author continually makes the larvae create new cocoons decorated with new materials again and again with his experiments. In lines 33-36, the author states the "poor creatures were really rather relieved" when they were allowed to hatch and fly away, instead of constantly building cocoons. "relieved," "forget," and "problems" all indicate that the larvae were in a negative situation from which they were eventually freed. Answer choices A and C reflect positive reactions that

	would not result from negative situations, while we need more information (more of a reaction from the caddis) for answer choice D to work.

6. A conversation with the author's friend led the author to experiment with caddis larvae. **B**

Explanation	Look to lines 12-18, "I had been told by my friend…Deciding to experiment…" The author has a conversation with his friend about the friend's observation of cocoon development in caddis larvae, and the author then decides to experiment with his friend's observation. No book or famous naturalist is mentioned in the passage (A and C). While the author does spend most of his time collecting creatures from ponds and streams (answer choice D), it is the conversation with his friend that leads him to experiment on the larvae. We would need proof that the author experiments on his collection before the conversation for D to be true.

Reading Comprehension - Passage 2

7. "Northwest Coast Indians are famous for large, beautiful totem poles" best expresses the main idea of this passage. **D**

Explanation	The passage discusses the totem poles created by the Northwest Coast Indians—the poles' varying styles, how the poles are made, and the poles' history, decline, and return. Answer choices A and C only cover one part of the passage, while answer choice B is not mentioned in the passage.

8. The author implies that totem pole carving was abandoned for a long period. **A**

Explanation	While the passage does mention the 1800s and the 1950s, there is no direct connection between these dates and the abandonment of totem pole carving. However, look to lines 23-26, "In the 1950s, the few remaining carvers…reproduce old and decaying Kwakiutl poles." If something is old and decaying and no mention of any newer poles is made in the passage, then we have our evidence for answer choice A. Plus, the author does not mention anything about making a living or respect for totem pole carving and does not mention the population of cedar trees in the passage.

9. "A process is described in chronological order" best describes the organization of lines 8-17. **B**

Explanation	Lines 8-17 discuss the process of planning, designing, carving, and (in some cases) painting totem poles (in that order). Plus, "before" and "After" are indicators of time. The author does not contrast different totem pole designs and is not expressing an opinion (A and C), while answer choice D is more about the passage as a whole than lines 8-17.

10. According to the passage, totem poles were carved by Northwest Coast Indian tribes. **D**

Explanation	Look to lines 1-3, "Totem poles…are a trademark of the Northwest Coast Indians." Answer choice A is in contradiction with the passage's final paragraph, while answer choices B and C are in contradiction with the first paragraph.

11. The author of the passage appears to care most deeply about the fact that the artistic heritage of Northwest Coast Indians was saved.

D

Explanation	Since the passage is about the uniqueness of totem poles ("Each pole is different, and each pole tells its own story"), the author is demonstrating his interest in the art of totem pole carving. Plus, the author devotes a full paragraph to the near extinction and revival of totem pole carving. Answer choices A and C are not given nearly as much emphasis as answer choice D. Answer choice B is not even mentioned in the passage.

12. According to the passage, a museum helped preserve the art of totem pole carving by commissioning carvers to duplicate existing totem poles.

B

Explanation	Look to lines 23-26, "…few remaining carvers were hired by University of British Columbia Museum of Anthropology to reproduce old and decaying Kwakiutl poles." "commissioning" is the same thing as "hired" and "reproduce" is the same thing as "duplicate." "reproduce" is not the same thing as "preserve" (answer choice A), and answer choices C and D are not mentioned in the passage.

Reading Comprehension - Passage 3

13. The primary purpose of this passage is to suggest that reports expressing concern over the state of educational preparedness in the United States may be unnecessarily alarming.

A

Explanation	The passage opens with a statement about how "news media seem to be filled with alarming editorials" about the state of educational preparedness. The author then discusses two studies that counter the claims of the news media. Finally, the author closes with stating that the news media misunderstands jobs and their growth rate. Answer choice B is counter to what is stated in the passage, while the author does not express any lamentation for high school drop outs (answer choice D). Answer choice C does not appear anywhere in the passage either.

14. In line 6, "pundits" most nearly means experts.

B

Explanation	The "pundits" in lines 5-11 are declaring that "laser technology, robotics, and computer-controlled equipment" will be so influential in our lives that students must have "advanced training or even college degrees." In other words, the "pundits" in the news media "know" something to be true and are making recommendations based on that knowledge. If you want advice about something, you generally seek an "expert" on the matter, or a person who has a comprehensive or authoritative knowledge of something. Thus, answer choice B best matches "pundit" (an expert in a particular subject or field who is frequently called on to give opinions about it to the public). Answer choice A would only work if the people in the news media were stating a fact instead of an opinion ("editorials" are opinion pieces).

15. The author of the passage does all of the following EXCEPT compare trends in different countries.

C

Explanation	The author provides data (answer choice A) throughout the second paragraph and the end of the third paragraph and describes the research of two studies in the

	second paragraph (answer choice B). The author cites the statements of commentators from the news media in the first paragraph (answer choice D). Nowhere in the passage does the author compare the United States to another country.

16. The workforce being prepared by our schools today matches fairly closely the workforce likely to be needed by our society in the near future. **B**

Explanation	Answer choice A and D contradict the findings of the two studies, which state that the upcoming workforce will match future workforce needs. While the studies do include data about high school drop outs, nowhere in the passage does the author discuss the need for the public and educators to band together to prevent the drop outs. Only answer choice B is the only conclusion that can be drawn from the studies in the second paragraph of the passage.

17. The author's tone when discussing the news media is best described as critical. **B**

Explanation	The author presents evidence that contradicts the comments made by the news media and suggests that the news media is confused about the data. Thus, the author is placing the blame for the "discrepant conclusions" upon the media and not the researchers. The author would have presented data that confirmed the statements made by the news media if he "admired" them or he was "worried" about their statements (answer choices A and D). Although humor is subjective, nowhere in the passage does the author make light of the news media's comments or crack jokes at the news media's expense (answer choice B).

18. The purpose of the last paragraph (lines 40-55) is to provide an explanation for the differing points of view. **A**

Explanation	Look to lines 43-47, "One possible explanation for the discrepant conclusions…" The author is attempting to explain the differing points of view by stating that the news media is possibly confused about the "rates of growth with actual numbers of jobs." Nowhere in the third paragraph does the author express concern for the future welfare of the economy (answer choice B) or propose that additional research is needed (answer choice C). The author only criticizes the shortcomings of the news media's argument and not the researchers' (answer choice D).

Reading Comprehension - Passage 4

19. The passage is primarily concerned with providing background information for a discussion of the medieval home and its comforts. **C**

Explanation	The author opens with the statement, "Any discussion about domestic life…cannot refer to most of the population, who were poor." The author lays the groundwork for discussing the medieval home and its comforts by first discussing why the poor, aristocracy, and the clergy cannot be included in the discussion. The author is leaving out the rich from the discussion, so answer choice A doesn't work. Medieval art is mentioned not as important for the "bourgeois and the rich" but as an antidote for the poor, so answer choice B doesn't work. The political views in towns are only briefly mentioned in the third paragraph (answer choice D).

20. According to the passage, medieval pageants and festivals for the poor were appealing because they provided relief from a hard, bleak existence. **D**

Explanation	Look to lines 19-23, "The extravagant pageants and religious festivals…but also as antidotes to the miseries of everyday life." The pageants and festivals acted as an escape from the "wretched conditions under which they lived." The passage does not mention that the pageants and festivals were free, had much religious importance, or that they created an excuse to celebrate. Instead, the focus of the passage is on the terrible living conditions of the poor and how these pageants and festivals provided relief from those conditions.

21. The author suggests that we do not understand the "keenness" (line 10) of certain pleasures enjoyed by medieval people because we enjoy the pleasures mentioned fairly frequently. **D**

Explanation	In lines 9-12, the author cites a prominent (important or famous) historian, "We, at the present day…were formerly enjoyed." The historian is stating that present day people cannot appreciate the level of joy medieval people felt for the everyday comforts we now enjoy. Plus, the historian states that "health, wealth, and good fortune" were a "rarity" during that time. While this question requires a little more reading between the lines, you can also safely eliminate answer choices A, B, and C because they aren't even mentioned in the passage.

22. In the second paragraph (lines 24-34), the author states that the concept of "family" did not exist because children were sent away as soon as they were old enough to work. **D**

Explanation	Look to lines 28-31, "There was room only for the infants—the older children were separated from the parents and sent to work as apprentices or servants." Because their homes were too small to house them, the children were sent off to work as soon as possible—these children were never able to grow up with their parents and siblings as a "family." Thus, the idea of "family" and "home" had no meaning for the poor. Again, answer choices A, B, and C are not mentioned in the passage.

23. The author most likely uses similar terms from different languages (lines 38-42) in order to emphasize the widespread nature of a similar concept. **B**

Explanation	Look to lines 36-38, "The free town…was uniquely European." To further prove this statement, the author presents the names for the inhabitants of the free towns from various parts of Europe (France, Germany, Italy, and England) to show how widespread the concept was. These terms are all related to a single idea and do not represent a range or breadth of ideas (answer choice A). Answer choice C doesn't work because the author is trying to show how similar in structure and meaning the different terms are to one another. The origin of medieval languages isn't even discussed in the passage (answer choice D).

24. The passage suggests that loyalty to a king rather than a lord has the advantage of more potential for self-government. **C**

Explanation	Look to lines 44-48, "It described…elected councils…allegiance directly to the king instead of a lord." Since the "bourgeois" in most cases allied themselves directly to the king and not a lord, they were able to govern themselves with elected councils. Answer choices A, B, and D aren't even mentioned in the passage.

Reading Comprehension - Passage 5

25. The primary purpose of the passage is to show how Wright met his business partner.

B

Explanation	Honestly, this question is answered by the italicized text above the passage, "…describes an incident from his youth that was to lead to a business partnership in later life." Plus, the passage talks about Wright meeting Lamp and their many activities together. Answer choice A doesn't work because only Lamp's courage is shown, and we don't know if the bullies backed down or not (answer choice D). Plus, answer choice C isn't even discussed in the passage.

26. The mood of the first paragraph (lines 1-10) can best be described as one of youthful enthusiasm.

C

Explanation	The first paragraph is filled with positive words and phrases—quick, "could work almost as hard as a man," "wasn't afraid of anything," buoyantly, exclaimed. The author is illustrating how much he accomplished and grew on his uncle's farm. He is not demonstrating "overbearing pride" because he counters his "wasn't afraid of anything" statement with "—well, maybe a little afraid of storms and of people" (answer choice A). He is not showing how his "adolescent shyness" kept him from performing tasks at his uncle's farm (answer choice B), and his longing for September is only briefly mentioned at the beginning of the paragraph (answer choice D).

27. It can be inferred that Wright and Lamp required Charlie Doyon to give them money before joining their business because they thought that the business would benefit from a larger model press.

D

Explanation	Wright and Lamp created things together in lines 26-28, including the joint effort of setting type on their small printing press in lines 28-29. Since both Wright and Doyon put in effort into their projects, it can be inferred that Doyon would need to do the same—he must provide a larger press. The fact that Wright used the word "more" in describing the larger press also indicates Wright and Lamp thought the larger press would help more than their smaller press. Answer choice C is a very enticing choice, but we do not have any evidence from the passage that suggests Wright and Lamp were committed to their business. We also do not have any evidence in the passage for answer choices A and B.

28. The phrase "my foray into the unknown" (line 15) refers to Wright's entrance into a new school.

A

Explanation	Look to lines 11-12, the sentence before "my foray into the unknown," "On the day I approached the forbidding Second Ward School, I was less sure of myself." Wright is unsure of himself as he enters this new school because he hadn't made any friends during the summer on his uncle's farm. His encounter with Robie Lamp (answer choice B) occurs in a separate paragraph, and Wright's experiences on his uncle's farms were known in the first paragraph (answer choice C). Answer choice D is not even mentioned in the passage.

29. The sentence "I so admired Robie's courage and resourcefulness that we became friends of the heart" (lines 24-26) is included in order to explain why Wright and Lamp's friendship was a lasting one.

C

Explanation	The phrase "friends of the heart" indicates that Wright saw a kindred spirit in Lamp and Wright's great admiration for Lamp created a link between them as important as the link between the heart and the body. We do not know if Wright wanted to torment Lamp (answer choice A) or if Lamp was older than Wright (answer choice D). Plus, answer choice B doesn't work because Lamp demonstrates utter courage while Wright is "less sure of himself"—why would Lamp be lucky to win Wright's friendship?

30. In line 31, "inveigle" most nearly means acquire.

A

Explanation	The word "inveigle" means to persuade something to do something, usually through flattery or deception. While we don't know what Doyon did to obtain two hundred dollars from his father, we do know that he did obtain it and the boys were able to buy the larger press. Thus, "acquire" best matches what happens in the passage. "dismiss" and "return" have the opposite effect of obtaining the two hundred dollars, and Doyon would not "purchase" two hundred dollars from his father.

Mathematics Achievement

1. $40\ cm^2$ **A**

Tools: area, evaluating shapes

Steps: (1) Since each shaded grid square's area is $5\ cm^2$, we simply need to count how many shaded grid squares there are and multiply that amount by 5

(2) 8 shaded grid squares $\times\ 5\ cm^2 = 40\ cm^2$

Quick Tips:
- You are allowed to write on your actual ISEE test booklet
- Draw lines through the shaded region to help accurately count the number of shaded grid squares

---

2. $\frac{5}{19} \times \frac{5}{19}$ **D**

Tools: probability

Steps: (1) Determine the probability of choosing a red ball from the jar for the first drawing ($\frac{number\ of\ positive\ outcomes\ for\ the\ event}{total\ number\ of\ possible\ outcomes}$)

(2) 5 red balls out of a total of 19 balls = $\frac{5}{19}$

(3) Since the ball is returned, the probability for choosing a red ball for the second event is also $\frac{5}{19}$

(4) To determine the probability of both events resulting in a red ball, we must multiply the two probabilities: $\frac{5}{19} \times \frac{5}{19}$

Quick Tips:
- Before starting your calculations, see how the answer choices are formatted—sometimes the answers are presented as a step in the process and not the final result

---

3. 3.241×10^7 **C**

Tools: scientific notation

Steps: (1) Convert the values into standard notation

(2) $3.2 \times 10^7 = 32{,}000{,}000$ and $4.1 \times 10^5 = 410{,}000$

(3) Find the sum of these values: $32{,}000{,}000 + 410{,}000 = 32{,}410{,}000$

(4) Convert this sum into scientific notation

(5) $32{,}410{,}000 = 3.241 \times 10^7$

Quick Tips:
- In converting values in standard notation to scientific notation, bring the decimal to the right of the largest place value
- In adding a number with more place values to a number with fewer place values, such as 10^7 and 10^5, the notation will most likely not change (10^7 will remain 10^7)

---

4. 0.6666667 **A**

Tools: fractions, decimals

Steps: (1) Compare each answer choice to $\frac{2}{3}$

(2) D) $\frac{2.4}{3.6} = \frac{2}{3}$; 2.4 and 3.6 are multiples of 1.2—if you divide both values by 1.2, you get $\frac{2}{3}$

(3) C) $\frac{1}{1.5} = \frac{2}{3}$; if you multiply 1 and 1.5 by 2, you get $\frac{2}{3}$
(4) B) $0.\overline{6} = \frac{2}{3}$; if you convert $\frac{2}{3}$ to a fraction, you get 0.666666 repeating
(5) A) $0.6666667 > \frac{2}{3}$; answer choice A is $\frac{2}{3}$ rounded up to the ten millionths place value, which is not the same thing as $\frac{2}{3}$

Quick Tips:
- Compare fractions by multiplying the denominator of one to the numerator of the other

---

5. 0 **D**

Tools: zero product property
Steps: (1) Notice that the equation is a value times *t* is equal to *t*, or $10t = t$
(2) If you subtract *t* from both sides, your new equation is $9t = 0$
(3) The zero product property states that if the product of two values is zero, one of the values is zero—in this case, *t* must be zero

Quick Tips:
- Whatever action you take to balance an equation must make sense
- If you divide both sides by *t*, you get $10 = 1$ (which is not true)

---

6. There are no values for *x* that would make the equation true. **D**

Tools: division properties, commutative property
Steps: (1) When adding values, the commutative property states that you can change the order without changing the result
(2) If you switch the order of the values in the denominator, you'll notice that it is the same as the expression in the numerator: $\frac{x+3}{3+x} \rightarrow \frac{x+3}{x+3}$
(3) Whenever a number is divided by itself, the quotient is 1 (except for 0); thus, the result for $\frac{x+3}{x+3} = 1$ and not 0
(4) No values for *x* will make the original equation true

Quick Tips:
- Keep all mathematical properties in mind when dealing with these problems
- If you input values, you'll notice that D is the only possible answer as well

---

7. 13 **B**

Tools: order of operations
Steps: (1) You must first add the values together under the radical in $\sqrt{25 + 144}$ before taking the square root
(2) $25 + 144 = 169 \rightarrow \sqrt{169} = 13$
(3) You cannot take the square root of each value first and then add the resulting values: $\sqrt{25 + 144} \neq \sqrt{25} + \sqrt{144} \rightarrow 5 + 12 \rightarrow 17$

Quick Tips:
- Treat the values under the radical as if they are surrounded by parentheses: $\sqrt{(25 + 144)}$—you must complete operations in the parentheses before taking the square root
- However, in multiplication of values under a radical, you can take the square root first: $\sqrt{(25)(144)} = \sqrt{3600} = 60 \rightarrow \left(\sqrt{25}\right)\left(\sqrt{144}\right) = (5)(12) = 60$

8. 185 C

Tools: median, analyzing charts and graphs

Steps: (1) Arrange the dogs' scores in order from least to greatest
(2) 155, 160, 175, 175, 180, 190, 195, 195, 195, 200
(3) The median is the middle value of a range of values, but when two values share the middle (180 and 190) you must find the average of those values
(4) $\frac{180+190}{2} = \frac{370}{2} = 185$

Quick Tips:
- If a range of values has an odd number of values, a specific value from that range will be the median
- If a range of values has an even number of values, then two values will share the middle and the average of these two values is the actual median

---

9. 2 A

Tools: system of linear equations (or proportion)

Steps: (1) Create an equation that represents the relation between the number of defective parts each machine makes: $A = 2B$
(2) Create another equation the represents the total number of defective parts made yesterday: $A + B = 6$
(3) Since we are looking for the number of defective parts made by Machine B, substitute A with $2B$ so that the second equation only has the B variable
(4) $A + B = 6 \rightarrow (2B) + B = 6 \rightarrow 3B = 6 \rightarrow B = 2$

Quick Tips:
- You could also set up a proportion for the first equation: 2 to 1 or 2:1 (where Machine A makes 2 defects for every 1 defect made by Machine B)
- From this proportion, you can evaluate how many defective parts created by each machine would add up to 6 and still keep the proportion true
- $2:1 = 3$ parts; thus, $(2)(2):(1)(2) = (3)(2) \rightarrow 4:2 = 6$ parts

---

10. 94 B

Tools: mean

Steps: (1) We do not know the exact final exam score, but we can set up a mean equation with the final exam score as $2x$ (the final exam is multiplied by 2 because it is counted twice in her mean) set equal to the desired mean of 93
(2) $\frac{93+89+95+2x}{5} = 93 \rightarrow \frac{2x+277}{5} = 93 \rightarrow 2x + 277 = 93(5) \rightarrow 2x + 277 = 465$
(3) $2x + 277 = 465 \rightarrow 2x = 188 \rightarrow x = 94$

Quick Tips:
- Although Lisa is only taking 4 tests, we divide the sum of her scores by 5 because the final exam is being counted twice towards her mean

---

11. 1 A

Tools: data analysis, mode

Steps: (1) Mode is the value that appears the most frequently in a range of values, but we must make sure we are choosing the mode from the correct range of values (the outputs)
(2) While the left column of the data table does have values, those values simply represent the number of times the right column's values occur—the left column is our inputs while the right column is our outputs

(3) If you write out all of the values from the right column according to their frequency from the left column, then you have the data set {0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 3, 3, 4, 4}
(4) The value 1 (1 pet) occurs the most in this set of data and is our mode

Quick Tips:
- Answer choices C and D can be quickly eliminated because no student has more than 4 pets
- If you were to convert this data table into a graph, the *x*-axis would be the Number of Pets (our inputs) while the *y*-axis would be the Number of Students Owning That Number of Pets (our outputs)

---

12. $24n^2m$ D

Tools: prime numbers, multiples

Steps:
(1) We need a value that each of the algebraic expressions $8n$, $6nm$, and $4n^2$ can divide into without any remainders
(2) While $6nm$ can divide into answer choice A, the other two expressions cannot
(3) While $6nm$ can divide into answer choice B, the other two expressions cannot
(4) While $6nm$ and $8n$ can divide into answer choice C, $4n^2$ cannot
(5) All three expressions can divide into answer choice D

Quick Tips:
- Answer choices A and B can be quickly eliminated because 6 is not a multiple of 4 or 8
- Answer choice C can be quickly eliminated because n is not a multiple of n^2—instead, n is a factor of n^2

---

13. 3 D

Tools: balancing equations

Steps:
(1) Look at the placement of the 3s on the left side and the *y*s on the right side of the equation—they share the same places in each term
(2) $3x - 3 = xy - y \rightarrow 3x - 3 = yx - y$; thus, $y = 3$ because the equation is balanced
(3) You can also input some possible values for *x*, such as 0
(4) $3x - 3 = xy - y \rightarrow 3(0) - 3 = (0)y - y \rightarrow -3 = -y \rightarrow 3 = y$

Quick Tips:
- You can also input the answer choices in for *y* to see if the equation remains balanced, but be mindful of subtraction signs coupled with negative inputs

---

14. $5x^2y^4 - x^4y^2$ C

Tools: operations on algebraic expressions

Steps:
(1) Add and subtract like terms in the expression—"like terms" refers to terms with the same variables set to the same exponents, such as $3x^4y^2 - 4x^4y^2$
(2) $2x^2y^4 + 3x^4y^2 - (4x^4y^2 - 3x^2y^4) \rightarrow 2x^2y^4 + 3x^4y^2 - 4x^4y^2 + 3x^2y^4$
(3) $2x^2y^4 + 3x^2y^4 + 3x^4y^2 - 4x^4y^2 \rightarrow 5x^2y^4 - x^4y^2$

Quick Tips:
- Be sure to distribute the negative sign to the terms inside of the parentheses
- x^2y^4 and x^4y^2 are not like terms because each *x* and *y* in the terms are raised to different exponents

15. $x = -5$ and $x = 5$ C

Tools: factoring quadratic equations, definition of zero, zero product property

Steps:
(1) Notice that the rational equation is set equal to zero—since 0 divided by any other number (except 0) is equal to zero, the result of the expression in the numerator must be 0
(2) Set the numerator equal to zero and solve for x: $x^2 - 25 = 0 \rightarrow x^2 = 25 \rightarrow x = 5$
(3) However, the square of 5 and –5 both result in +25, so $x = \pm 5$
(4) If the denominator were equal to 0, the equation would be undefined—we must make sure that 5 and –5 won't make the denominator equal to 0
(5) Set each term in the denominator equal to zero and follow the zero product property (if the product of two terms is equal to zero, then one of the terms is zero)
(6) $x + 2 = 0 \rightarrow x = -2$
(7) $x - 3 = 0 \rightarrow x = 3$
(8) Thus, $x \neq -2$ or 3 (our 5 and –5 remain true)

Quick Tips:
- It might be faster to simply input the answer choices into the equation and see what happens
- If you see a complicated rational equation, the question is likely testing a simple property that solves the question quickly

---

16. $x^2 + x - 6$ D

Tools: multiplying polynomials (FOIL/distributive property)

Steps:
(1) Follow FOIL to solve the expression$(x - 2)(x + 3)$
(2) First: $(x)(x) = x^2$
(3) Outside: $(3)(x) = 3x$
(4) Inside: $(-2)(x) = -2x$
(5) Last: $(-2)(3) = -6$
(6) Add all terms together: $x^2 + 3x - 2x - 6 \rightarrow x^2 + x - 6$

Quick Tips:
- You can also use the distributive property if you are more comfortable with it
- $(x - 2)(x + 3) \rightarrow x(x + 3) - 2(x + 3) \rightarrow x^2 + 3x - 2x - 6 \rightarrow x^2 + x - 6$

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17. –2 B

Tools: graphs of linear equations (slope)

Steps:
(1) Graphs of linear equations with a downward slope, like the one presented in the question, represent a negative slope
(2) Slope is the same thing as $\frac{rise}{run}$ or $\frac{change\ in\ y}{change\ in\ x}$ or $\frac{y_2 - y_1}{x_2 - x_1}$
(3) Select two points on the graph, such as the y-intercept (0, 5) and (2, 1)
(4) $\frac{1-5}{2-0} = \frac{-4}{2} = -2$; thus, the slope is –2 for this line

Quick Tips:
- If you start with the y-intercept, you can see that the line slopes down 2 (–2) and to the right 1 (+1) (a slope of $\frac{-2}{1} = -2$)

18. 5 grid units C

Tools: distance formula (graphs), circle

Steps: (1) You are given two points—one in the center of the circle and one on the edge of the circle

(2) The distance between these two points is the same thing as the radius of the circle (the length from the center to the edge of the circle)

(3) Use the distance formula to solve: $d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

(4) $d = \sqrt{(1-(-2))^2 + (8-4)^2} \rightarrow \sqrt{(1+2)^2 + (4)^2} \rightarrow \sqrt{(3)^2 + (4)^2}$

(5) $\sqrt{(3)^2 + (4)^2} \rightarrow \sqrt{9+16} \rightarrow \sqrt{25} = 5$ grid units

Quick Tips:
- If you forget the distance formula, you can draw out the graph of this circle and approximate the distance between the two points
- You can even use the previous question's graph to draw your circle

---

19. a random sample of all the students in the school — B

Tools: data analysis

Steps: (1) Consider the bias (one-sidedness) of each answer choice and the probability of hours spent watching TV by the groups

(2) For answer choice A, Terri's friends will likely watch the same shows as Terri and for the same number of hours, so this group will not accurately reflect the student body

(3) For answer choice B, a random selection assures the least amount of bias and an unknown probability of hours spent watching TV, so this group will best reflect the student body

(4) For answer choice C, if the whole group has shown up to watch a football game, then they share a bias and schedule that only reflects their group, so this group does not accurately reflect the student body

(5) For answer choice D, if the whole group is in the library before school, then they share a bias and schedule that only reflects their group, so this group does not accurately reflect the student body

Quick Tips:
- A random sample of the population (free from bias and categorization) provides the best representation of that population
- Specific groups will share biases that warp the collected data towards their interests and will not reflect the variety and diversity of a population

---

20. 45° — A

Tools: angles in a quadrilateral

Steps: (1) A quadrilateral is a polygon with 4 straight sides—squares and rectangles are quadrilaterals

(2) If the sum of the interior angles of a square or rectangle equal 360°, then so must other quadrilaterals

(3) Find the sum of the interior angles of this quadrilateral and set it equal to 360°

(4) $110° + 75° + 130° + ?° = 360° \rightarrow 315° + ?° = 360° \rightarrow ?° = 45°$

Quick Tips:
- The sum of any quadrilateral's interior angles is always 360° no matter how it looks

21. 20 — B

Tools: combinations

Steps: (1) While you might be tempted to use the Fundamental Counting Principle for this problem, we are only dealing with one set of data—the debate team members

(2) We must use the combination formula to solve this problem, since the order of the selection doesn't matter: ${}_nC_r = \frac{n!}{r!(n-r)!}$

(3) n is the number of items in a set (6 debate team members) and r is the number of selections being made from that set (3)—the ! symbol is the product of the n and all positive integers below it (in descending order)

(4) $\frac{n!}{r!(n-r)!} \rightarrow \frac{6!}{3!(6-3)!} \rightarrow \frac{6\times5\times4\times3\times2\times1}{(3\times2\times1)(3\times2\times1)} \rightarrow \frac{6\times5\times4\cancel{\times3\times2\times1}}{(3\times2\times1)\cancel{(3\times2\times1)}} \rightarrow \frac{6\times5\times4}{3\times2\times1} \rightarrow \frac{120}{6} = 20$

Quick Tips:

- Combinations has a second formula that you can use if factorials seem too confusing: $\frac{n(n-1)(n-2)\ldots}{r(r-1)(r-2)\ldots}$ where the number of values multiplied in the numerator matchers the number of values in the denominator
- If you have 3 choices or selections in a combinations question, then you will have 3 values (ex. 6×5×4) in the numerator and 3 values (ex. 3×2×1) in the denominator

---

22. (7, 2) D

Tools: parallelogram, *xy*-coordinate plane

Steps: (1) A parallelogram is a polygon with parallel sides, such as a rhombus

(2) The fastest way to determine which of the following answer choices in the fourth vertex, or point, of the parallelogram is by plotting them on the graph

(3) If you look at points (–2, 3) and (1, 2), you'll notice that (1, 2) is 4 to the right and two down from (–2, 3); thus, the fourth vertex should match this pattern

(4) (7, 2) is 4 to the right and 2 down from point (3, 4)

Quick Tips:

- After you plot the points, you can draw faint lines between the points to visually evaluate which of the answer choices is the fourth vertex

---

23. $x \leq -\frac{1}{2}$ or $x \geq 4$ D

Tools: absolute value, algebraic inequalities

Steps: (1) To solve for absolute value with algebraic inequalities, you solve the equation twice—1) with the inequality as is but without the bars and 2) again without the bars by the right side of the inequality multiplied by –1

(2) $|4x - 7| \geq 9 \rightarrow 4x - 7 \geq 9 \rightarrow 4x \geq 16 \rightarrow x \geq 4$

(3) $|4x - 7| \geq 9 \rightarrow 4x - 7 \leq -9 \rightarrow 4x \leq -2 \rightarrow x \leq -\frac{2}{4} \rightarrow x \leq -\frac{1}{2}$

(4) You can check these answers by inputting them back into the inequality with the absolute value bars

Quick Tips:

- When you multiply or divide a side of the inequality by a negative number, the inequality sign must switch directions

24. complex number C

Tools: number types

Steps:
(1) This question requires that you know the definitions of integers, rational numbers, complex numbers, and irrational numbers
(2) Irrational numbers are values that cannot be represented as fractions (ex. π)
(3) An integer is a value that can be a positive or negative number or zero, but it cannot be a fraction or decimal
(4) A rational number is a value that can be represented as a fraction
(5) A complex number contains a real number and an imaginary number—an imaginary number is a value that does not exist, such as $\sqrt{-1}$
(6) The difference between two irrational numbers could result in an integer, rational number, or irrational number because all three of these number types are real numbers
(7) Because irrational numbers are real numbers and have no imaginary part, the difference between two irrational numbers cannot result in a complex number—$a + bi$ is a complex number where a is a real number while bi is an imaginary number (b is a real number, but $i = \sqrt{-1}$)

Quick Tips:
- While you may not know the definition of a complex number, you should know the definitions of the other three number types and can reason out the result of subtracting two irrational numbers

---

25. 3.25 B

Tools: mean, analyzing charts and graphs

Steps:
(1) Identify the number of books read from the data
(2) 5 students each read 1 book (5 books), 4 students each read 2 books (8 books), 2 students each read 3 books (6 books), 1 student read 4 books (4 books), 6 students each read 5 books (30 books), and 2 students each read 6 books (12 books)
(3) Find the sum of the books read and divide that sum by the total number of students
(4) $5 + 8 + 6 + 4 + 30 + 12 = 65$ books
(5) $5 + 4 + 2 + 1 + 6 + 2 = 20$ students
(6) $\frac{65}{20} \rightarrow \frac{13}{4} \rightarrow 3\frac{1}{4} \rightarrow 3.25$ books per student

Quick Tips:
- Answer choices A and D can be quickly eliminated because dividing 65 by 20 will not result in an integer
- Since multiplication can be easier for some students than dividing, you can multiply answer choices B and C by 20 to see if they equal 65 (total books)

---

26. $|x + 3| < 4$ D

Tools: absolute value, inequalities, number lines

Steps:
(1) The open circles indicate that the possible inputs for x are less than 1 but greater than –7, such as 0 or –6, but the inputs cannot be 1 or –7
(2) Input 0 for each answer choice
(3) A) $|0 - 4| < 3 \rightarrow |-4| < 3 \rightarrow 4 < 3$ (not true, so eliminate it)
(4) B) $|0 + 4| < 3 \rightarrow |4| < 3 \rightarrow 4 < 3$ (not true, so eliminate it)
(5) C) $|0 - 3| < 4 \rightarrow |-3| < 4 \rightarrow 3 < 4$ (true, so we must test it again)
(6) D) $|0 + 3| < 4 \rightarrow |3| < 4 \rightarrow 3 < 4$ (true, so we must test it again)

(7) Input –6 for each remaining answer choice
(8) C) $|-6-3|<4 \rightarrow |-9|<4 \rightarrow 9<4$ (not true, so eliminate it)
(9) D) $|-6+3|<4 \rightarrow |-3|<4 \rightarrow 3<4$ (true, this is our answer)

Quick Tips:
- Use simple integers from a range of inputs when possible
- You can also solve each answer choice, but this may take some students longer than simply testing inputs
- $|x+3|<4 \rightarrow x+3<4 \rightarrow x<1$
- $|x+3|<4 \rightarrow x+3>-4 \rightarrow x>-7$; thus, D is $-7<x<1$

---

27. $\frac{3}{2}$ B

Tools: probability

Steps:
(1) Each toss of the coin is an independent event, which means that the outcome of one toss does not affect the outcome of the other tosses
(2) The probability of coin toss landing heads up is $\frac{1}{2}$; thus, the probability of tossing 3 heads in a row is $\frac{1}{2}\times\frac{1}{2}\times\frac{1}{2}=\frac{1}{8}$ (the same is true for no heads tossed)
(3) There are three possibilities for coin toss landing heads up 2 times—the first two tosses or the first and third toss or the second and third toss (the "or" is very important)
(4) The "or" signifies that we will add each possibilities' probability together to find the actual probability of a coin landing heads up twice: $\frac{1}{8}+\frac{1}{8}+\frac{1}{8}=\frac{3}{8}$ (the same is true for the coin landing heads up once)
(5) Here is a visual representation of all the possible outcomes: HHH, HHT, HTH, THH, HTT, THT, TTH, TTT (8 possible outcomes)
(6) There are a total of 12 Hs out of the 8 possible outcomes, which can be represented as $\frac{12}{8}\rightarrow\frac{3}{2}$
(7) The question can also be read to say "What is the probability of the first coin toss landing heads up, the second toss landing heads up, OR the third toss landing heads up?" In this case, you find the sum of the probability of each event: $\frac{1}{2}+\frac{1}{2}+\frac{1}{2}=\frac{3}{2}$

Quick Tips:
- You can also multiply the number of heads to their respective probabilities
- $3\left(\frac{1}{8}\right)+2\left(\frac{3}{8}\right)+1\left(\frac{3}{8}\right)+0\left(\frac{1}{8}\right)=\frac{3}{8}+\frac{6}{8}+\frac{3}{8}+0=\frac{12}{8}\rightarrow\frac{3}{2}$
- Pay close attention to how probability events influence one another (if at all)

---

28. $\frac{400\times60}{0.305\times5{,}280}$ A

Tools: converting measurements

Steps:
(1) Since the question is asking for the horse's speed in miles per hour, we need to write out ratios for each measurement provided
(2) $\frac{0.305\ meters}{1\ foot}$, $\frac{5{,}280\ feet}{1\ mile}$, $\frac{60\ minutes}{1\ hour}$, $\frac{400\ meters}{1\ minute}$ (the ratios can be flipped to accurately convert measurements)
(3) Our final ratio should be $\frac{miles}{hour}$—start with the horse's rate
(4) Convert meters to feet: $\frac{400\ meters}{1\ minute}\rightarrow\frac{400\ meters}{1\ minute}\times\frac{1\ foot}{0.305\ meters}$ (we flipped the ratio to eliminate *meters* from the conversion

(5) Convert feet to miles: $\frac{400}{1\ minute} \times \frac{1\ foot}{0.305} \times \frac{1\ mile}{5{,}280\ feet}$ (we flipped the ratio to eliminate *foot/feet* from the conversion)

(6) Convert minutes to hours: $\frac{400}{1\ minute} \times \frac{60\ minutes}{1\ hour} \times \frac{1}{0.305} \times \frac{1\ mile}{5{,}280}$ (eliminate *minutes*)

(7) All that remains is $\frac{miles}{hour}$: $\frac{400}{1} \times \frac{60}{1\ hour} \times \frac{1}{0.305} \times \frac{1\ mile}{5{,}280} \rightarrow \frac{400 \times 60}{0.305 \times 5{,}280}$

Quick Tips:
- Look at the answer choices to see how far you need to go in your calculations—this problem just wants to see if you know how to set up conversions

---

29. 12 feet — B

Tools: proportion

Steps:
(1) The question is stating the height of an object is proportional to the length of its shadow—the ratio of the pole's height to its shadow is $\frac{3}{5}$ (the numerator is the height and the denominator is the shadow length)

(2) We can create the same ratio for the tree's height and shadow length: $\frac{x}{20}$ (the numerator is the height and the denominator is the shadow length)

(3) Set the two ratios equal to one another to create the proportion and solve for *x*: $\frac{3}{5} = \frac{x}{20}$

(4) Cross multiply: $\frac{3}{5} = \frac{x}{20} \rightarrow 5x = 60 \rightarrow x = 12$ feet

Quick Tips:
- The type of value in the numerator of one ratio must match the type of value in the numerator of the other ratio in a proportion (the same is true for the denominators)—in this case, both numerators are the height of the objects while both denominators are the shadow lengths

---

30. centimeters — A

Tools: measurements

Steps:
(1) Answer choices B and C are measurements for weight and will not measure the length of the leaf

(2) Answer choices A and C are measurements for length, but a meter is a greater degree of measurement than a centimeter (100 centimeters for 1 meter)

(3) Since the question is asking for a reasonable measurement for a leaf, imagine or draw a standard sized leaf—while there are some leaves that could be measured using meters, these leaves would likely be no greater than a meter

(4) Thus, the most reasonable measurement for measuring the length of a leaf is centimeters

Quick Tips:
- The ISEE requires that you understand metric measurements (conversions and application in the real world)

31. $\sqrt{25-4}$ — C

Tools: radicals, number types
Steps: (1) An integer is a positive or negative number (including zero) that cannot include a fraction or decimal
(2) Answer choice A: $\sqrt{4} - \sqrt{25} \rightarrow 2 - 5 = -3$ (integer)
(3) Answer choice B: $\sqrt{4} \times \sqrt{25} \rightarrow 2 \times 5 = 10$ (integer)
(4) Answer choice C: $\sqrt{25 - 4} \rightarrow \sqrt{21} = 4.582 \ldots$ (not an integer)
(5) Answer choice D: $\sqrt{4 \times 25} \rightarrow \sqrt{100} = 10$ (integer)
Quick Tips:
- Answer choices B and D can immediately be eliminated because they are the exact same, just presented in a slightly different way: $\sqrt{4} \times \sqrt{25} = \sqrt{4 \times 25}$

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32. $(100 - 25\pi)$ cm^2 C

Tools: circle (area), square (area)
Steps: (1) Find the area of the square ($s^2 = A_s$)
(2) $10^2 = 100$
(3) Find the area of the circle ($\pi r^2 = A_c$)
(4) The radius is half the diameter of the circle, and the diameter is the same length as the width of the square (10); thus, $r = \frac{d}{2} \rightarrow r = \frac{10}{2} \rightarrow r = 5$
(5) $\pi r^2 \rightarrow \pi(5)^2 \rightarrow 25\pi$
(6) The area of the shaded region is the area of the circle subtracted from the area of the square: $100 - 25\pi$
Quick Tips:
- Look to the answer choices to see how far you need to go with your calculations—this question does not need you to finish subtracting the area of the square from the area of the circle

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33. 108π B

Tools: volume (cylinder)
Steps: (1) Find the height of the cylinder, which is two times the cylinder's diameter
(2) $h = 2d \rightarrow h = 2(6) \rightarrow h = 12$
(3) Use the given formula for the volume of a cylinder to solve (r is the cylinder's radius, or half of the cylinder's diameter (3 inches))
(4) $V = r^2 h\pi \rightarrow (3)^2(12)\pi \rightarrow (9)(12)\pi \rightarrow 108\pi$
Quick Tips:
- Look to the answer choices to see how far you need to go with your calculations—we do not need to multiply the values to the actual value of pi

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34. 55 B

Tools: box-and-whisker plot, number lines, range
Steps: (1) While you may or may not know what a box-and-whisker plot is, you should know range (the difference between the smallest and largest value in a set of data) and number lines
(2) The set of the data falls between 25 degrees and 80 degrees, stating that at some point over 50 years, the same day in the month of May was 25 degrees at least once and 80 degrees at least once
(3) Thus, 25 degrees is our smallest value while 80 degrees is our largest value from the set of data
(4) $80 - 25 = 55$

Quick Tips:
- A box-and-whisker plot represents the median, lower and upper quartiles, and the extremes of a set of data on a number line to demonstrate the distribution of these values
- The far left and right points of the thin line indicate the extreme values (lowest and highest amount)—what we needed for this problem
- The box represents the quartiles, where the far left line indicates the first quartile, the "middle" line indicates the median, and the far right line indicates the third quartile
- Quartiles are three points that divide the set of data into four groups, with each group comprising a quarter of the data (the data is also ranked)

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35. $\frac{4}{14}$ A

Tools: probability

Steps:
(1) Because Kate removed a yellow marble from the bag, the probability of Joanne's selection is influenced; however, we are only looking for the probability of Joanne's selection for this problem ($\frac{\#\ of\ positve\ outcomes}{total\ possible\ outcomes}$)
(2) The bag contains 15 marbles—4 green, 5 blue, 2 yellow, and 4 orange
(3) Since Kate has removed a yellow marble, the bag now contains 14 marbles
(4) The bag now contains 4 green marbles out of 14 marbles, and the probability of Joanne drawing a green marble is $\frac{4}{14}$

Quick Tips:
- Look to the answer choices to see how far you need to go with your calculations—we do not need to reduce $\frac{4}{14} \rightarrow \frac{2}{7}$
- Answer choices C and D represent the probability of Kate AND Joanne's selection, while answer choice B does not reflect Kate keeping her marble

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36. $4x^8$ B

Tools: radicals, operations on algebraic expressions, commutative property

Steps:
(1) 16 and x^{16} are commutative; thus, you can place each value under its own radical: $\sqrt{16x^{16}} \rightarrow (\sqrt{(16)(x^{16})} \rightarrow (\sqrt{16})(\sqrt{x^{16}})$
(2) $\left(\sqrt{16}\right)\left(\sqrt{x^{16}}\right) \rightarrow (4)(\sqrt{x^{16}})$
(3) When you multiply values with the same base, such as x^5 and x^8 (x is the base), then you simply add the exponents together ($(x^5)(x^8) \rightarrow x^{13}$)
(4) In this case, you need two of the same variable whose product is x^{16}—in other words, two of the same variable with the same exponents that add up to 16
(5) If you divide 16 in half, you find that you need x raised to the power of 8
(6) $\sqrt{x^{16}} \rightarrow x^8$ (if you multiply x^8 and x^8, you get x^{16})
(7) $(4)(x^8) \rightarrow 4x^8$

Quick Tips:
- The square root of a value can also be written as the value taken to the ½ power: $\sqrt{x} = x^{\frac{1}{2}}$ (numerator is the power while the denominator is the root)
- You can convert $\sqrt{x^{16}}$ the same way: $\sqrt{x^{16}} \rightarrow x^{\frac{16}{2}} \rightarrow x^8$

37. $\frac{2}{\sin 20°}$ A

Tools: trigonometry

Steps:
(1) Sine (sine), cosine (cos), and tangent (tan) are trigonometric functions of angles in the context of right triangles. These functions represent a particular ratio of two side lengths of the triangle in relation to a known angle (not the 90° angle)
(2) Sin represents the ratio of the side length opposite of the known angle and the right triangle's hypotenuse ($\frac{opposite}{hypotenuse}$)
(3) Tan represents the ratio of the side length opposite of the known angle and the side length adjacent (next to) the known angle ($\frac{opposite}{adjacent}$)
(4) In this right triangle, we are given the angle 20°, the side length of 2 cm (which is opposite the known angle), and the fact we are looking for the length of the triangle's hypotenuse (x)
(5) Since the information includes the opposite length and the hypotenuse, we need to use sine's ratio of $\frac{opposite}{hypotenuse}$
(6) $\sin 20° = \frac{2}{x} \rightarrow (x)(\sin 20°) = \cancel{(x)}\left(\frac{2}{\cancel{x}}\right) \rightarrow (x)(\sin 20°) = 2 \rightarrow \frac{(x)\cancel{(\sin 20°)}}{\cancel{\sin 20°}} = \frac{2}{\sin 20°}$
(7) $x = \frac{2}{\sin 20°}$

Quick Tips:
- You can remember the ratios of sine, cosine, and tangent using the mnemonic device SOH-CAH-TOA
- $\sin\theta = \frac{opposite}{hypotenuse}$; $\cos\theta = \frac{adjacent}{hypotenuse}$; and $\tan\theta = \frac{opposite}{adjacent}$

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38. Answer choice A's number line graph A

Tools: compound inequalities, number lines

Steps:
(1) Simplify $41 \leq 2x - 1 \leq 51$ so that x is by itself
(2) Start with the left part of the compound inequality: $41 \leq 2x - 1$
(3) $41 \leq 2x - 1 \rightarrow 42 \leq 2x \rightarrow 21 \leq x$
(4) Solve again for the right part of the compound inequality: $2x - 1 \leq 51$
(5) $2x - 1 \leq 51 \rightarrow 2x \leq 52 \rightarrow x \leq 26$
(6) Rewrite $21 \leq x$ and $x \leq 26$ as a compound inequality: $21 \leq x \leq 26$
(7) Only answer choice A's number line graph represents the smallest possible value for x as 21 and the largest possible value for x as 26

Quick Tips:
- Answer choice B represents an estimation of $41 \leq 2x - 1 \leq 51$, where 41 and 51 are divided by 2. The problem is that 51 divided by two falls below 30, so this estimation is too large of a range of values
- Answer choice C represents $41 \leq x \leq 51$, but not $41 \leq 2x - 1 \leq 51$
- Answer choice D represents an estimation of $41 \leq 2x - 1 \leq 51$, where 41 is divided by 2 and 51 is doubled. The problem is that 51 should be divided by 2 just as 41 is, so this estimation doesn't follow proper operation procedures

39. 78 C

Tools: median, stem-and-leaf plot

Steps:
(1) If you do not know how a stem-and-leaf plot works, then look to the answer choices—each value is double digit
(2) You can then reason that the leaf is the one's place value of a single value and the stem is the higher place values of that same value
(3) If the stem is 5 and the leaf is 7, then the value is 57. If the stem is 10 and the leaf is 0, then the value is 100
(4) Written out, the data points are 55, 57, 58, 62, 62, 62, 64, 66, 67, 68, 74, 76, 76, 76, 77, 78, 78, 79, 79, 83, 83, 83, 84, 84, 85, 91, 92, 92, 93, 97, 98, 99, and 100
(5) In all, there are 33 data points, which means that the median will be one of these points—if the data set contains an odd number of values, then one of the values will be the median; if the data set contains an even number, then the average of the two middle numbers is the median
(6) While you can spend your time crossing out numbers until you reach the middle number, you can also recognize that 70, 75, and 80 are not data points that exist in this data set
(7) Thus, only answer choice C can be correct since it is the only data point that exists in the set

Quick Tips:
- If a problem seems like it will take a long time to figure out, there is likely an easier way to solve the problem
- In this case, we know that the median will be one of the existing data points in a set of data that contains an odd number of data points or values

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40. $\pm 7i$ D

Tools: imaginary numbers, commutative property, associative property

Steps:
(1) At a quick glance, you can recognize that the only way for 49 to become 0 is by subtracting 49 (or adding –49) to it; however, you also know that no squared real number can result in a negative number
(2) Somehow, we need the square of 7 or –7 to make –49 for this equation to be true—enter the imaginary number $\sqrt{-1}$ or i
(3) Set x by itself in the equation: $x^2 + 49 = 0 \rightarrow x^2 = -49 \rightarrow x = \sqrt{-49}$
(4) $\sqrt{-49}$ is also imaginary, but we can write it in a different way using the commutative and associative properties
(5) $\sqrt{-49} \rightarrow \sqrt{(-1)(49)} \rightarrow \left(\sqrt{-1}\right)\left(\sqrt{49}\right) \rightarrow \left(\sqrt{-1}\right)(7) \rightarrow 7\sqrt{-1}$
(6) Since the square of both 7 and –7 make 49, we must include both numbers as square roots of 49: $\pm 7\sqrt{-1}$
(7) If we use i for $\sqrt{-1}$, then $\pm 7\sqrt{-1}$ is $\pm 7i$

Quick Tips:
- If you square $\sqrt{-1}$, then you get –1 (just like squaring $\sqrt{8}$: $\left(\sqrt{8}\right)^2 = 8$)
- $\left(\sqrt{-1}\right)^2 \rightarrow \left(\sqrt{-1}\right)\left(\sqrt{-1}\right) \rightarrow -1$
- Converting the radical to a power demonstrates why the radicals are canceled out: $\left(\sqrt{-1}\right)^2 \rightarrow \left(-1^{\frac{1}{2}}\right)^2 \rightarrow \left(-1^{\frac{2}{2}}\right) \rightarrow \left(-1^{\frac{1}{1}}\right) \rightarrow (-1)$

41. $\begin{bmatrix} 7 & 6 \\ 2 & 5 \end{bmatrix}$ A

Tools: matrices (addition)

Steps: (1) When adding matrices, these boxes with columns and rows of values, you simply add the values located in the same column and row in one matrix as the other matrix

(2) In this case, 2 in the first matrix and 5 in the second matrix are located in the first row and first column; thus, we find the sum of these two values and place it in the same spot in the resulting matrix (and so on for the other values)

(3) $\begin{bmatrix} 2 & 3 \\ 0 & 4 \end{bmatrix} + \begin{bmatrix} 5 & 3 \\ 2 & 1 \end{bmatrix} = \begin{bmatrix} 2+5 & 3+3 \\ 0+2 & 4+1 \end{bmatrix} = \begin{bmatrix} 7 & 6 \\ 2 & 5 \end{bmatrix}$

Quick Tips:

- Answer choices C and D do not have 6 in the first row and second column spot, so we can eliminate these answers
- Answer choice B does not have 2 in the second row and first column spot, so we can eliminate it as an answer
- In addition of matrices, the two or more matrices must have the same number of rows and columns—you cannot add together a matrix with 2 rows and 2 columns to a matrix with 3 rows and 3 columns

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42. 2 cm **A**

Tools: surface area (sphere)

Steps: (1) We are given the formula for the surface area of a sphere ($SA = 4\pi r^2$) and the actual surface area of a particular sphere (16π cm^2)

(2) Input the known surface area into the formula and solve for the radius

(3) $16\pi = 4\pi r^2 \rightarrow 16 = 4r^2 \rightarrow 4 = r^2 \rightarrow r = 2$

Quick Tips:

- Since both sides of the equation contain π, we can cancel it out and the equation will remain balanced
- You can estimate that the radius will be a much smaller number than 16 because it will be divided by 4 and then taken to its square root (we can quickly eliminate answer choices C and D)