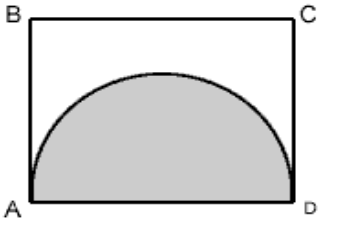
Test 1
Part 1. Problem Solving

1. If $x^2 - y^2 = 55$, and $x - y = 11$, then $y =$
(A) 8 (B) 5 (C) 3 (D) -8 (E) -3

2. In a sports club with 30 members, 17 play badminton and 19 play tennis and 2 do not play either. How many members play both badminton and tennis?
(A) 7 (B) 8 (C) 9 (D) 10 (E) 11



(figure not to scale)

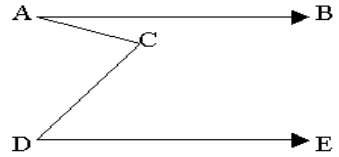
3. Rectangle ABCD has a perimeter of 26. The half circle with diameter AD has an area of 8π. What is the perimeter of the part of the figure that is not shaded?
(A) 26 + 4π (B) 18 + 8π (C) 18 + 4π (D) 14 + 4π (E) 14 + 2π

4. 6 people meet for a business lunch. Each person shakes hands once with each other person present. How many handshakes take place?
(A) 30 (B) 21 (C) 18 (D) 15 (E) 10

5. $(3 \times 10^4) + (2 \times 10^2) + (4 \times 10) =$
(A) 302400 (B) 32400 (C) 30240 (D) 3240 (E) 324

6. Andy solves problems 74 to 125 inclusive in a Math exercise. How many problems does he solve?
(A) 53 (B) 52 (C) 51 (D) 50 (E) 49

7. If $n > 0$, which of the following must be true?
I $n^2 > 1$
II $n - n^2 < 0$
III $2n - 1 > 0$
(A) I only (B) II only (C) III only (D) I and II only (E) none



(figure not to scale)

8. AB and DE are parallel. Angle BAC = 30 , angle CDE = 50. What is the measure of angle ACD?
(A) 100 (B) 90 (C) 80 (D) 70 (E) cannot be determined

9. The total weight of a tin and the cookies it contains is 2 pounds. After ¾ of the cookies are eaten, the tin and the remaining cookies weigh 0.8 pounds. What is the weight of the empty tin in pounds?
(A) 0.2 (B) 0.3 (C) 0.4 (D) 0.5 (E) 0.6

10. If $y \text{ ¤ } x = y^{2x}$ for all positive integers, then $(3 \text{ ¤ } 4) \text{ ¤ } 2 =$
(A) 3^8 (B) 3^{12} (C) 3^{16} (D) 3^{24} (E) 3^{32}

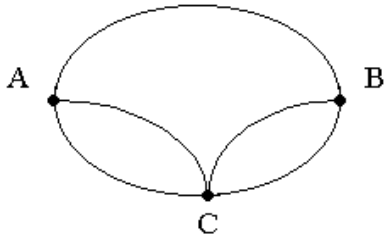
11. $3x + y = 19$, and $x + 3y = 1$.
Find the value of $2x + 2y$
(A) 20 (B) 18 (C) 11 (D) 10 (E) 5

12. The price of a cycle is reduced by 25 per cent. The new price is reduced by a further 20 per cent. The two reductions together are equal to a single reduction of
(A) 45% (B) 40% (C) 35% (D) 32.5% (E) 30%

13. In a class of 78 students 41 are taking French, 22 are taking German and 9 students are taking both French and German. How many students are not enrolled in either course?
(A) 6 (B) 15 (C) 24 (D) 33 (E) 54

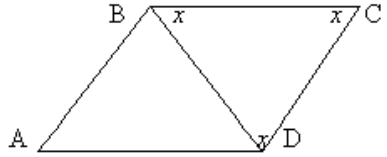
14. 12 litres of water a poured into an aquarium of dimensions 50cm length , 30cm breadth, and 40 cm height. How high (in cm) will the water rise?
(1 litre = $1000cm^3$)
(A) 6 (B) 8 (C) 10 (D) 20 (E) 40

15. A certain animal in the zoo has consumed 39 pounds of food in six days. If it continues to eat at the same rate, in how many more days will its total consumption be 91 pounds?
(A) 12 (B) 11 (C) 10 (D) 9 (E) 8



16. Amy has to visit towns B and C in any order. The roads connecting these towns with her home are shown on the diagram. How many different routes can she take starting from A and returning to A, going through both B and C and not travelling any road twice on the same trip?

(A) 10 (B) 8 (C) 6 (D) 4 (E) 2

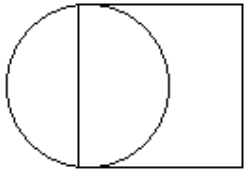


17. ABCD is a parallelogram. BD = 2. The angles of triangle BCD are all equal. What is the perimeter of the parallelogram?

(A) 12 (B) $9\sqrt{3}$ (C) 9 (D) 8 (E) $3\sqrt{3}$

18. If the product of 6 integers is negative, at most how many of the integers can be negative?

(A) 2 (B) 3 (C) 4 (D) 5 (E) 6



19. In the figure above the square has two sides which are tangent to the circle. If the area of the circle is $4a^2\pi$, what is the area of the square?

(A) $2a^2$ (B) $4a$ (C) $4a^2$ (D) $16a^2$ (E) $64a^2$

20. Sheila works 8 hours per day on Monday, Wednesday and Friday, and 6 hours per day on Tuesday and Thursday. She does not work on Saturday and Sunday. She earns $324 per week. How much does she earn in dollars per hour?

(A) 11 (B) 10 (C) 9 (D) 8 (E) 7

Part 2. Data Sufficiency

Decision Rules

(A) Statement (1) ALONE is sufficient, but statement (2) ALONE is not sufficient.
(B) Statement (2) ALONE is sufficient, but statement (1) ALONE is not sufficient.
(C) BOTH statements TOGETHER are sufficient, but NEITHER statement ALONE is sufficient.
(D) EACH statement ALONE is sufficient.
(E) Statements (1) and (2) TOGETHER are NOT sufficient.

1. Kelly's raise increased his salary by what percent?
   (1) Kelly's raise was $1,200.
   (2) Kelly's raise increased his taxes to $1,700.

2. Mouse population X doubles every week. How many weeks from now will population X first exceed 1,000,000 ?
   (1) The mouse population is now 65,536.
   (2) Fifteen weeks ago the mouse population was 2.

3. If no student took test T more than once, how many students took test T?
   (1) The average (arithmetic mean) of the students' scores on test T was 72.
   (2) The sum of he students' scores on test T was 2,232.

4. If $x + 2y = 6$, what is the value of x?
   (1) $2x + y = 9$
   (2) $3x + 2y = 14$

5. Last year 4/5 of the applicants for a job on a police force passed the physical examination. If 3/4 of the applicants who passed the physical examination also passed the written examination, how many of the applicants passed both examinations?
   (1) The number of applicants who did not pass either examination was equal to the number who passed the written examination only.
   (2) There was a total of 100 applicants.

6. Is the integer n even?
   (1) n^2 -1 is odd.
   (2) $\sqrt{n}$ is an integer.

7. If today is Carol's birthday, how old is Carol?
   (1) 6 years ago she was half her present age.
   (2) 3 years from now she will be 3 times as old as she was 7 years ago.

8. If x, y, and z are positive, what is the value of x ?
   (1) x + y = z + y
   (2) z – y = 4 – y

9. If y > 0, is y greater than x?
   (1) 3x = 2y
   (2) x + y = 5

10. Did the population of Country S increase by less than 20 percent from 1965 to 1975?
    (1) The population of Country S in 1965 was 180 million.
    (2) The population of Country S in 1975 was 1.17 times what it was in 1965.

11. Four dollar amounts, w, x, y, and z, were invested in a business. Which amount was greatest'?
    (1) y < z < x
    (2) x was 25 percent of the total of the four investments.

12. If the measures of' the three interior angles of a triangle are y°, 15x°, and 18x°, what is the value of y ?
    (1) x =5
    (2) 15x + y = 90

13. What is the average (arithmetic mean) of x and y?
    (1) x/2 + y/2 = 10
    (2) x = 2y

14. How many bags of grass seed were used for rectangular lawn X?
    (1) Lawn X has a perimeter of 720 feet.
    (2) One bag of grass seed was used for each 5,000 square feet of lawn X

15. If n is a positive integer, is n divisible by at least six positive integers?
    (1) n is the product of three different prime numbers.
    (2) n = 30

16. If b is the product of three consecutive positive integers c, c + 1, and c + 2, is b a multiple of 24?
    (1) b is a multiple of 3,
    (2) c is odd.

17. If x and y are integers, is x + y divisible by 6?
    (1) x is divisible by 6.
    (2) y is divisible by 6.

18. In a given class, what is the average (arithmetic mean) height per pupil?
    (1) The average (arithmetic mean) height of the girls in the class is 61 inches.
    (2) The average (arithmetic mean) height of the boys in the class is 64 inches.

19. Are integers r and s consecutive ?
    (1) r is odd and s is even.
    (2) r - s = 1

20. A raincoat and an umbrella cost a total of $53.50. What is the cost of the raincoat?
    (1) If the cost of the raincoat were to increase by 10 percent, the raincoat and the umbrella would cost a total of $58.00.
    (2) The cost of the raincoat is $2.50 more than 5 times the cost of the umbrella.

Part 3. Critical Reasoning

1. An eyeglass manufacturer tried to boost sales for the summer quarter by offering its distributors a special discount if their orders for that quarter exceeded those for last year's summer quarter by at least 20 percent. Many distributors qualified for this discount. Even with much merchandise discounted, sales increased enough to produce a healthy gain in net profits. The manufacturer plans to repeat this success by offering the same sort of discount for the fall quarter.

Which of the following, if true, most clearly points to a flaw in the manufacturer's plan to repeat the successful performance of the summer quarter?

(A) In general, a distributor's orders for the summer quarter are no higher than those for the spring quarter.
(B) Along with offering special discounts to qualifying distributors, the manufacturer increased newspaper and radio advertising in those distributors' sales areas.
(C) The distributors most likely to qualify for the manufacturer's special discount are those whose orders were unusually low a year earlier.
(D) The distributors how qualified for the manufacturer's special discount were free to decide how much of that discount to pass on to their own customers.
(E) The distributors' ordering more goods in the summer quarter left them overstocked for the fall quarter.

2. Journalist: In physics journals, the number of articles reporting the results of experiments involving particle accelerators was lower last year than it had been in previous years. Several of the particle accelerators at major research institutions were out of service the year before last for repairs, so it is likely that the low number of articles was due to the decline in availability of particle accelerators.

Which of the following, if true, most seriously undermines the journalist's argument?

(A) Every article based on experiments with particle accelerators that was submitted for publication last year actually was published.
(B) The average time scientists must wait for access to a particle accelerator has declined over the last several years.
(C) The number of physics journals was the same last year as in previous years.
(D) Particle accelerators can be used for more than one group of experiments in any given year.
(E) Recent changes in the editorial policies of several physics journals have decreased the likelihood that articles concerning particle-accelerator research will be accepted for publication.

3. The proposal to hire ten new police officers in Middletown is quite foolish. There is sufficient funding to pay the salaries of the new officers, but not the salaries of additional court and prison employees to process the increased caseload of arrests and convictions that new officers usually generate.

Which of the following, if true, will most seriously weaken the conclusion drawn above?

(A) Studies have shown that an increase in a city's police force does not necessarily reduce crime.
(B) When one major city increased its police force by 19 percent last year, there were 40 percent more arrests and 13 percent more convictions.
(C) If funding for the new police officers' salaries is approved, support for other city services will have to be reduced during the next fiscal year.
(D) In most United States cities, not all arrests result in convictions, and not all convictions result in prison terms.
(E) Middletown's ratio of police officers to citizens has reached a level at which an increase in the number of officers will have a deterrent effect on crime.

4. A recent report determined that although only three percent of drivers on Maryland highways equipped their vehicles with radar detectors, thirty-three percent of all vehicles ticketed for exceeding the speed limit were equipped with them. Clearly, drivers who equip their vehicles with radar detectors are more likely to exceed the speed limit regularly than are drivers who do not.

The conclusion drawn above depends on which of the following assumptions?

(A) Drivers who equip their vehicles with radar detectors are less likely to be ticketed for exceeding the speed limit than are drivers who do not.
(B) Drivers who are ticketed for exceeding the speed limit are more likely to exceed the speed limit regularly than are drivers who are not ticketed.
(C) The number of vehicles that were ticketed for exceeding the speed limit was greater than the number of vehicles that were equipped with radar detectors.
(D) Many of the vehicles that were ticketed for exceeding the speed limit were ticketed more than once in the time period covered by the report.
(E) Drivers on Maryland highways exceeded the speed limit more often than did drivers on other state highways not covered in the report.

5. Researchers have found that when very overweight people, who tend to have relatively low metabolic rates, lose weight primarily through dieting, their metabolisms generally remain unchanged. They will thus burn significantly fewer calories at the new weight than do people whose weight is normally at that level. Such newly thin persons will, therefore, ultimately regain weight until their body size again matches their metabolic rate.

The conclusion of the argument above depends on which of the following assumptions?
(A) Relatively few very overweight people who have dieted down to a new weight tend to continue to consume substantially fewer calories than do people whose normal weight is at that level.
(B) The metabolisms of people who are usually not overweight are much more able to vary than the metabolisms of people who have been very overweight.
(C) The amount of calories that a person usually burns in a day is determined more by the amount that is consumed that day than by the current weight of the individual.
(D) Researchers have not yet determined whether the metabolic rates of formerly very overweight individuals can be accelerated by means of chemical agents.
(E) Because of the constancy of their metabolic rates, people who are at their usual weight normally have as much difficulty gaining weight as they do losing it.

6. In 1987 sinusitis was the most common chronic medical condition in the United States, followed by arthritis and high blood pressure, in that order. The incidence rates for both arthritis and high blood pressure increase with age, but the incidence rate for sinusitis is the same for people of all ages. The average age of the United States population will increase between 1987 and 2000.

Which of the following conclusions can be most properly drawn about chronic medical conditions in the United States from the information given above?

(A) Sinusitis will be more common than either arthritis or high blood pressure in 2000.
(B) Arthritis will be the most common chronic medical condition in 2000.
(C) The average age of people suffering from sinusitis will increase between 1987 and 2000.

(D) Fewer people will suffer from sinusitis in 2000 than suffered from it in 1987.
(E) A majority of the population will suffer from at least one of the medical conditions mentioned above by the year 2000.

7. Parasitic wasps lay their eggs directly into the eggs of various host insects in exactly the right numbers for any suitable size of host egg. If they laid too many eggs in a host egg, the developing wasp larvae would compete with each other to the death for nutrients and space. If too few eggs were laid, portions of the host egg would decay, killing the wasp larvae.

Which of the following conclusions can properly be drawn from the information above?

(A) The size of the smallest host egg that a wasp could theoretically parasitize can be determined from the wasp's egg-laying behavior.
(B) Host insects lack any effective defenses against the form of predation practiced by parasitic wasps.
(C) Parasitic wasps learn from experience how many eggs to lay into the eggs of different host species.
(D) Failure to lay enough eggs would lead to the death of the developing wasp larvae more quickly than would laying too many eggs.
(E) Parasitic wasps use visual clues to calculate the size of a host egg.

8. Northern Air has dozens of flights daily into and out of Belleville Airport, which is highly congested. Northern Air depends for its success on economy and quick turnaround and consequently is planning to replace its large planes with Skybuses, whose novel aerodynamic design is extremely fuel efficient. The Skybus' fuel efficiency results in both lower fuel costs and reduced time spent refueling.

Which of the following, if true, could present the most serious disadvantage for Northern Air in replacing their large planes with Skybuses?

(A) The Skybus would enable Northern Air to schedule direct flights to destinations that currently require stops for refueling.
(B) Aviation fuel is projected to decline in price over the next several years.
(C) The fuel efficiency of the Skybus would enable Northern Air to eliminate refueling at some of its destinations, but several mechanics would lose their jobs.
(D) None of Northern Air's competitors that use Belleville Airport are considering buying Skybuses.
(E) The aerodynamic design of the Skybus causes turbulence behind it when taking off that forces other planes on the runway to delay their takeoffs.

9. Products sold under a brand name used to command premium prices because, in general, they were superior to nonbrand rival products. Technical expertise in product development has become so widespread, however, that special quality advantages are very hard to obtain these days and even harder to maintain. As a consequence, brand-name products generally neither offer higher quality nor sell at higher prices. Paradoxically, brand names are a bigger marketing advantage than ever.

Which of the following, if true, most helps to resolve the paradox outlined above?

(A) Brand names are taken by consumers as a guarantee of getting a product as good as the best rival products.
(B) Consumers recognize that the quality of products sold under invariant brand names can drift over time.
(C) In many acquisitions of one corporation by another, the acquiring corporation is interested more in acquiring the right to use certain brand names than in acquiring existing production facilities.
(D) In the days when special quality advantages were easier to obtain than they are now, it was also easier to get new brand names established.
(E) The advertising of a company's brand-name products is at times transferred to a new advertising agency, especially when sales are declining.

10. A museum has been offered an undocumented statue, supposedly Greek and from the sixth century B.C. Possibly the statue is genuine but undocumented because it was recently unearthed or because it has been privately owned. However, an ancient surface usually has uneven weathering, whereas the surface of this statue has the uniform quality characteristically produced by a chemical bath used by forgers to imitate a weathered surface. Therefore, the statue is probably a forgery.

Which of the following, if true, most seriously weakens the argument?

(A) Museums can accept a recently unearthed statue only with valid export documentation from its country of origin.
(B) The subject's pose and other aspects of the subject's treatment exhibit all the most common features of Greek statues of the sixth century B.C.
(C) The chemical bath that forgers use was at one time used by dealers and collectors to remove the splotchy surface appearance of genuinely ancient sculptures.
(D) Museum officials believe that forgers have no technique that can convincingly simulate the patchy weathering characteristic of the surfaces of ancient sculptures.
(E) An allegedly Roman sculpture with a uniform surface similar to that of the stature being offered to the museum was recently shown to be a forgery.

Answers
Problem solving
1. E 2. B 3. C 4. D 5. C 6. B 7. E 8. C 9. C 10. E 11. D 12. A 13. C 14. B 15. E16. B17. D18. D19. D 20. C

Data sufficiency
1. E 2. D 3. C 4.D 5.B 6.A 7. D 8.C 9. C10. B11.C 12. D13. A14. E15.D 16.E 17.C 18. E19. B 20. D

Critical thinking
1. E 2. E 3. D 4. A 5. A 6. C 7.C 8. E 9. A 10. C