



**PERSONALITY DEVELOPMENT ASSOCIATION
MADRAS INSTITUTE OF TECHNOLOGY
ANNA UNIVERSITY – CHENNAI
“DISCOVER THYSELF”**

Aptitude Test No.:01

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1. $x = a^2b^3c^4$ where in x is +ve with a, b, c as prime factors. How many other factors does x have which are greater than 1?

- a)52 b)56 c)60 d)64

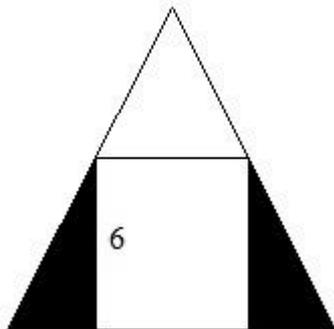
Solution:

No. Of factors $= (2+1)*(3+1)*(4+1) = 3*4*5 = 60$

Other factors greater than 1 and except $a, b, c = 60 - 4 = 56$

Answer: B

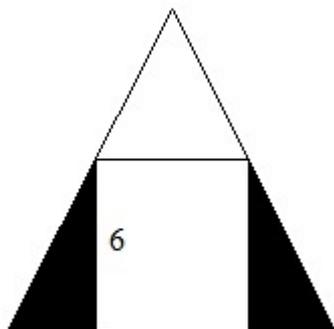
2. A square with side 6 is inscribed in an equi triangle as shown. What is the area of shaded region?



- a) $6\sqrt{3}$ b) $12\sqrt{3}$ c) $24\sqrt{3}$ d) $6+6\sqrt{3}$
e) $12+12\sqrt{3}$

Solution:

In a shaded triangle the height=6 and angles are 90 degree, 60 degree(angle of equi triangle) and the remaining angle is 30 degree.



a

So, $\tan 60 = \frac{6}{a}$ and $a = \frac{6}{\sqrt{3}}$

The area of a single triangle $= \frac{1}{2} * \frac{6}{\sqrt{3}} * 6 = 6\sqrt{3}$

Therefore the shaded area $= 2 \cdot 6\sqrt{3} = 12\sqrt{3}$

Answer: **B**

3. $(n-4)(n^2-2n-15)=0$. What are all the possible values of n more than one?

- a)-5 b)-3 c)3 d)4 e)5

Solution:

By solving this equation, roots are $= -3, 4, 5$

The n value more than 1 are 4, 5

Answer: **both d and e**

4. Sum of 5 digits of a number is 41. Find the probability that such a number is divisible by 11?

- a) $2/15$ b) $11/36$ c) $3/35$ d) $6/35$

Solution:

in order to get the sum as 41, the following 5 digit combination exist:

99995 \rightarrow no. of 5 digits = 5

99986 \rightarrow no. of 5 digit = 20

99977 \rightarrow no. of 5 digit = 10

99887 \rightarrow no. of 5 digit = 30

98888 \rightarrow no. of 5 digit = 5

now, 70 such number exists.,

now for a 5 digit number of form (pqrst) to be divisible by

$(p,r,t)+(q,s)=41$

$(p,r,t)=(9,9,8)$ and $(q,s)=(8,7)$ -----(1)

or $(p,r,t)=(9,9,8)$ and $(q,s)=(9,6)$ -----(2)

using 1st eqn we can construct $(3!/2!)*2! = 6$ numbers

using 2nd eqn we can construct $(3!/2!)*2! = 6$ numbers

number of favble cases = 12.,

hence required probability = $12/70 = 6/35$

Answer: **D**

5. Two squares are chosen at random on a chessboard. What is the probability that they have a side in common?

- a) $1/8$ b) $64/4032$ c) $63/64$ d) $1/9$

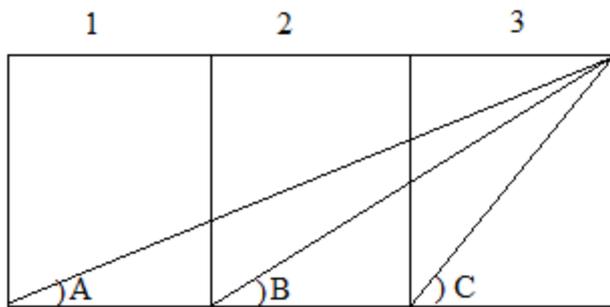
Solution:

Seven unique adjacent squares set in each row and column.

Therefore $7 \cdot (8+8)/64C_2 = 1/8$

Answer: **A**

6. 1, 2, 3 are squares.



- a) $A+B>C$ b) $A+B<C$ c) $A+B=C$ d) No relation

Solution:

Let the side of the square is x .

$\tan C=1$ and $C=45$ degrees

$\tan B=1/2$ and $B= 25$ degrees

$\tan A =1/3$ and $A= 30$ degrees

Answer: **C**

7. J has 228 marbles more than K. If B gives each of them 133 marbles, J will have twice as many marbles as K. How many marbles does J have?

- a) 95 b)190 c)228 d)323 e)456

Solutions:

Let x be the marbles of J and y be the marbles of K

So, $x=y+228$ and $2(y+133)=x+133$. By solving these equations we get

$x=323$ and $y= 95$.

Answer: **D**

8. What is the unit digit in $\{(6374)^{1793} \times (625)^{317} \times (341)^{491}\}$?

- a)0 b)2 c)3 d)5

Solution:

Unit digit of $(6374)^{1793} = \text{unit digit of } (4)^{1793} = \text{unit digit of } (4^2)^{896} = \text{unit digit of } (6*4) =4$

Unit digit of $(625)^{317} =5$

Unit digit of $(341)^{491} =1$

Required unit digit= $\text{unit digit of } (5*4*1) =0$

Answer: **A**

9. A circle touches the hypotenuse of a right angle triangle at its middle point and passes through the mid-point of the shorter side. If a and b ($a<b$) be the length of the sides, then the radius is

- a) $b(\sqrt{a^2+b^2})/a$ b) $b(\sqrt{a^2-b^2})/2a$ c) $b(\sqrt{a^2+b^2})/4a$ d) None of these

Solution:

Let $C(0,0)$, $B(a,0)$ and $A(0,b)$ be the vertices of the triangle.

Let $H(h,k)$ be the center of the circle. The circle passes through $L(a/2, 0)$ and $M(a/2, b/2)$. It follows that H lies on the perpendicular bisector of LM .

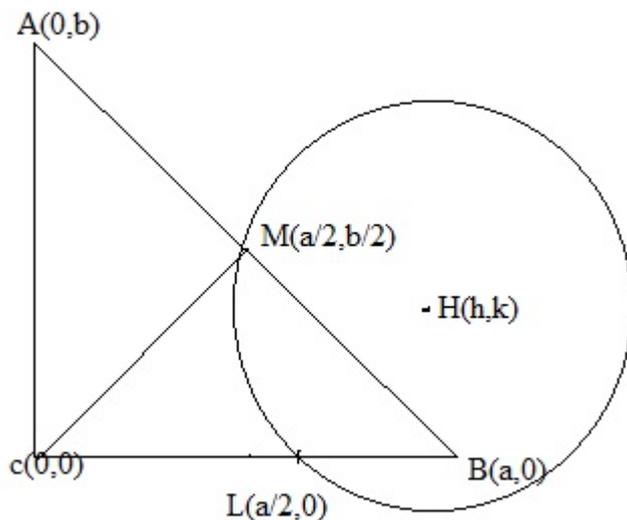
Therefore $k=b/4$. AB has a slope $=-b/a$. therefore HM must have slope a/b

Therefore $(k-(b/2))/(a/2)=a/b$ or $h=(a/2)-(b^2/4a)$

$$r^2 = (h-(a/2))^2 + (k-0)^2 = (b^4/16a^2) + (b^2/16)$$

$$r = (b/4a)\sqrt{a^2+b^2}$$

Answer: **C**



10. It is being given that $(2^{32} + 1)$ is completely divisible by a whole number.

Which of the following numbers is completely divisible by this number?

- a) $(2^{16} + 1)$ b) $(2^{16} - 1)$ c) (7×2^{23}) d) $(2^{96} + 1)$

Solution:

Let $2^{32} = x$. Then $(2^{32} + 1) = (x + 1)$.

Let $(x + 1)$ be completely divisible by the natural number N . Then,

$(2^{96} + 1) = ((2^{32})^3 + 1) = (x^3 + 1) = (x + 1)(x^2 - x + 1)$, which is completely divisible by N , since $(x^2 - x + 1)$ is divisible by N .

Answer: **D**

The following table gives the percentage of marks obtained by seven students in six, different subjects in an examination. Study the table and answer the questions(11 to 15) based on it. The numbers in the brackets give the maximum marks in each subject.

(Max. Marks)	Maths (150)	Chemistry (130)	Physics (120)	Geography (100)	History (60)	Computer science (40)
Student						
Ayush	90	50	90	60	70	80

Aman	100	80	80	40	80	70
Sajal	90	60	70	70	90	70
Rohit	80	65	80	80	60	60
Muskan	80	65	85	95	50	90
Tanvi	70	75	65	85	40	60
Tharun	65	35	50	77	80	80

11. What was the aggregate of marks obtained by Sajal in all the six subjects?

- (a) 409 (b) 419 (c) 429 (d) 439 (e) 449

Solution:

Aggregate marks obtained by Sajal

$$= [(90\% \text{ of } 150) + (60\% \text{ of } 130) + (70\% \text{ of } 120) + (70\% \text{ of } 100) + (90\% \text{ of } 60) + (70\% \text{ of } 40)] = 135 + 78 + 84 + 70 + 54 + 28 = 449.$$

Answer: **E**

12. What is the overall percentage of Thrun?

- (a) 52.5% (b) 55% (c) 60% (d) 63% (e) 64.5%

Solution:

Aggregate marks obtained by Tarun .

$$= [(65\% \text{ of } 150) + (35\% \text{ of } 130) + (50\% \text{ of } 120) + (77\% \text{ of } 100) + (80\% \text{ of } 60) + (80\% \text{ of } 40)] = 97.5 + 45.5 + 60 + 77 + 48 + 32 = 360.$$

Total maximum marks (of all the six subjects)

$$= (150 + 130 + 120 + 100 + 60 + 40) = 600.$$

$$\text{Overall percentage of Tarun} = (360 \times 100/600) \% = 60\%.$$

Answer: **C**

13. What are the average marks obtained by all the seven students in Physics? (rounded off to two digits after decimal)

- (a) 77.26 (b) 89.14 (c) 91.37 (d) 96.11 (e) 103.21

Solution:

Average marks obtained in Physics by all the seven students

$$= (1/7) [(90\% \text{ of } 120) + (80\% \text{ of } 120) + (70\% \text{ of } 120) + (80\% \text{ of } 120)$$

$$+ (85\% \text{ of } 120) + (65\% \text{ of } 120) + (50\% \text{ of } 120)]$$

$$= (1/7) [(90 + 80 + 70 + 80 + 85 + 65 + 50)\% \text{ of } 120]$$

$$= (1/7) [520\% \text{ of } 120] = 89.14.$$

Answer: **B**

14. The number of students who obtained 60% and above marks in all the Subjects is :

- (a) 1 (b) 2 (c) 3 (d) None of these

Solution:

From the table it is clear that Sajal and Rohit have 60% or more Marks in each of the six subjects.

Answer: **B**

15. In which subject is the overall percentage the best?

(a) History (b) Maths (c) Physics (d) Chemistry (e) Geography

Solution:

We shall find the overall percentage (for all the seven students) with respect to each subject.

The overall percentage for any subject is equal to the average of percentages obtained by all the seven students since the maximum marks for any subject is the same for all the students.

Therefore, overall percentage for:

$$(i) \text{ Maths} = [1/7(90+100+90+80+80+70+65)]\% \\ = [1/7(575)]\% = 82.14\%.$$

$$(ii) \text{ Chemistry} = [1/7(50 + 80 + 60 + 65 + 65 + 75 + 35)]\% \\ = [1/7(430)]\% = 61.43\%.$$

$$(iii) \text{ Physics} = [1/7(90 + 80 + 70 + 80 + 85 + 65 + 50)]\% \\ = [1/7(520)]\% = 74.29\%.$$

$$(iv) \text{ Geography} = [1/7(60 + 40 + 70 + 80 + 95 + 85 + 77)]\% \\ = [1/7(507)]\% = 72.43\%.$$

$$(v) \text{ History} = [1/7 (70 + 80 + 90+ 60 + 50 + 40 + 80)]\% \\ = 1/7 [(470)]\% = 67.14\%.$$

$$(vi) \text{ Computer Science} = [1/7 (80 + 70 + 70 + 60 + 90 + 60 + 80)]\% \\ = [1/7(510)]\% = 72.86\%.$$

Clearly; this. percentage is highest for Maths.

Answer: **B**

16. What is the output of the program?

```
Main()
```

```
{
```

```
int x=10,y=10,z=5,i;
```

```
i=x<y<z;
```

```
Printf(“%d”,i)
```

```
}
```

a)0 b)1 c)10 d)5 e)none of these

Solution:

The "<" operator function's direction is from left to right. So it first compares $x < y$. It is false. So it gives the value as 0. This value is compared with z. So the answer is 1

Answer: **B**

17. What is the output of the program?

```
#define x 5+2
```

```
Main()
```

```
int i;
```

```
i=x*x*x;
```

```
printf("%d",i)
```

```
}
```

a)343 b)125 c)compilation error d)none of these

Solution:

The value of x is stored as 5+2 itself not as 7. So the i value is calculated as follows. $5+2*5+2*5+2 = 5+10+10+2 = 27$

Answer: **D**

18. find the output of the program

```
main()
```

```
{
```

```
float me = 1.1;
```

```
double you = 1.1;
```

```
if(me==you)
```

```
printf("I love you");
```

```
else
```

```
printf("I hate you");
```

```
}
```

a) I love you b) I hate you c) compilation error d)none of these

Solution:

For floating point numbers (float, double, long double) the values cannot be predicted exactly. Depending on the number of bytes, the precision with of the value represented varies. Float takes 4 bytes and long double takes 10 bytes. So float stores 0.9 with less precision than long double.

Rule of Thumb:

Never compare or at-least be cautious when using floating point numbers with relational operators ($==$, $>$, $<$, $<=$, $>=$, $!=$).

Answer: **B**

19. find the output of the program

```
main()
{
extern int i;
i=20;
printf("%d",i);
}
```

a)20 b)21 c)compilation error d)linker error

Solution:

extern storage class in the following declaration,

extern int i;

specifies to the compiler that the memory for **i** is allocated in some other program and that address will be given to the current program at the time of linking. But linker finds that no other variable of name **i** is available in any other program with memory space allocated for it. Hence a linker error has occurred.

Answer: D Linker Error : Undefined symbol '_i'

20. Find the output of the program

```
main()
{
char *p;
printf("%d, %d ",sizeof(*p),sizeof(p));
}
```

a)2, 2 b)1, 2 c)2, 1 d)1, 1 e)none of these

Solution:

The sizeof() operator gives the number of bytes taken by its operand. **p** is a character pointer, which needs one byte for storing its value (a character). Hence sizeof(*p) gives a value of 1. Since it needs two bytes to store the address of the character pointer sizeof(p) gives 2.

Answer: B