|  | 1ST | 2ND | 3RD | 4TH | 5TH |
| --- | --- | --- | --- | --- | --- |
| **R1** | H1 | H2 | H3 | H4 | H5 |
| **R2** | H6 | H7 | H8 | H9 | H10 |
| **R3** | H11 | H12 | H13 | H14 | H15 |
| **R4** | H16 | H17 | H18 | H19 | H20 |
| **R5** | H21 | H22 | H23 | H24 | H25 |
| **R6** | H1 | H6 | H11 | H16 | H21 |
| **R7** |  |  |  |  |  |

**SDF TUTORIAL SHEET 2**

Q1.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1ST | 2ND | 3RD | 4TH | 5TH |
| **R1** | H1 | H2 | H3 | ~~H4~~ | ~~H5~~ |
| **R2** | H6 | H7 | ~~H8~~ | ~~H9~~ | ~~H10~~ |
| **R3** | H11 | ~~H12~~ | ~~H13~~ | ~~H14~~ | ~~H15~~ |
| **R4** | ~~H16~~ | ~~H17~~ | ~~H18~~ | ~~H19~~ | ~~H20~~ |
| **R5** | ~~H21~~ | ~~H22~~ | ~~H23~~ | ~~H24~~ | ~~H25~~ |
| **R6** | H1 | H6 | H11 | H16 | H21 |
| **R7** | H1 | H6 | H2 | H3 | 11 |

**SO MINIMUM 7 RACES ARE REQUIRED.**

Q2.

6

8

7

3

4

5

2

1

Let us name the coins as,

1

2

3

Divide them into following groups,

G 3

G 2

G 1

6

8

7

5

4

Step1) Compare G1 and G2. **[comparison 1]**

Case 1:

* if G1 = G2, then the fake coin is present in G3. { i.e. all the coins in G1 G2 are genuine}
* Compare coin 1 and coin 7. **[comparison 2]**
* If coin 1 and 7 weigh the same, then coin 8 is the fake coin else **coin** **7 is the fake one**.

Case 2:

* If G1 > G2 then, the fake coin can be either in G1 or G2. { i.e. all the coins in G3 are genuine}

Case 2.1: Fake coin is in G1 {i.e. fake coin is heavy}

* + Compare coin 1 + coin 7 with coin 2 + coin 8. **[comparison 2]**
    - If they weigh the same , then coin 3 may be the fake coin.
      * Now compare coin 3 with coin 8. **[comparison3]**
      * If they weigh the same then 3 is not the fake coin else **coin** **3 is the fake coin**.
    - If (coin1 + coin 7)> (coin2 + coin 8) then **coin 1 is the fake coin** else **coin 2 is the fake coin.**

Case 2.2: Fake coin is in G2 {i.e. fake coin is lighter}

* + Compare coin 4 + coin 7 with coin 5 + coin 8. **[comparison 2]**
    - If they weigh the same , then **coin 6 is the fake coin**.
    - If (coin 4 + coin 7)> (coin 5 + coin 8) then **coin 5 is the fake coin** else **coin 4 is the fake coin.**

Case 3:

* If G1 < G2 then, the fake coin can be either in G1 or G2. { i.e. all the coins in G3 are genuine}

Case 3.1: Fake coin is in G1 {i.e. fake coin is lighter }

* + Compare coin 1 + coin 7 with coin 2 + coin 8. **[comparison 2]**
    - If they weigh the same , then coin 3 may be the fake coin.
      * Now compare coin 3 with coin 8. **[comparison 3]**
      * If they weigh the same then 3 is not the fake coin else **coin** **3 is the fake coin**.
    - If (coin1 + coin 7)> (coin2 + coin 8) then **coin 2 is the fake coin** else **coin 1 is the fake coin.**

Case 3.2: Fake coin is in G2 {i.e. fake coin is heavier}

* + Compare coin 4 + coin 7 with coin 5 + coin 8. **[comparison 2]**
    - If they weigh the same , then **coin 6 is the fake coin**.
    - If (coin 4 + coin 7)> (coin 5 + coin 8) then **coin 4 is the fake coin** else **coin 5 is the fake coin.**

**SO WE NEED MINIMUM 3 COMPARISIONS TO DETECT THE FAKE COIN.**

**Q3.** **flow chart to find three fastest horses.**

group the horses into groups of 5 and race each group

Let H1, H2, H3, H4, H5 be the 1st rank holder of 5 groups respectively

A race is conducted between H1, H2, H3, H4, H5

Suppose H1 came 1st,H2 2nd,H3 3rd

7th race is conducted between H2, H3, H1.1, H1.2,H2.1

We get 2nd and 3rd fastest horse from 7th race

Q4.

|  |  |  |  |
| --- | --- | --- | --- |
|  | JUG A-8Ltrs | JUG B-5Ltrs | JUG C-3Ltrs |
| In beginning | 8 | 0 | 0 |
| Step 1 | 3 | 5 | 0 |
| Step2 | 3 | 2 | 3 |
| Step3 | 6 | 2 | 0 |
| Step4 | 6 | 0 | 2 |
| Step5 | 1 | 5 | 2 |
| Step6 | 1 | 4 | 3 |

**So, we can put 4Ltrs of water in Jug B in minimum 6 steps.**

Q5.

if Z==0

F

A=0, B=0, Z=0

T

A rolls the dice

D is from 1 to 6

B rolls the dice

D is from 1 to 6

A=A+D

B=B+D

Z=1

if A<=100

if B<=100

F

F

Z=0

F

F

T

T

if B is SH/LT

if B==100

F

F

if A is SH/LT

if A==100

T

T

Print: B wons

Print: A wons

T

T

B= ST or LH

A = ST or LH

Q6.

I=2

read: A wons

I=I+1

T

F

F

T

Print: A is a prime number

Print: A is not a prime number

if I<A/2

if A%I==0

Q7. #include<stdlib.h> //grade

#include<stdio.h>

int main()

{

float a,b,c,d,e,p,T;

printf("enter your marks in English Computer Hindi Maths Science out of 100 \n");

scanf("%f %f %f %f %f ",&a,&b,&c,&d,&e);

p=(a+b+c+d+e)/5;

printf("percentage=%f %\n",p);

T=(a+b+c+d+e);

printf("Total marks= %f \n",T);

}

Read : a, b, c, d, e wons

Print: enter your marks in English Computer Hindi Maths Science

p=(a+b+c+d+e)/5

T=(a+b+c+d+e)

Print: percentage=p% and Total marks=T

Q8. #include<stdlib.h>

#include<stdio.h>

int main()

{

int a,b;

printf("enter 2 numbers : \n");

scanf("%d",&a);

scanf("%d",&b);

printf("\n");

printf(a = "%d",a);

printf("\n");

printf("b = %d",b);

printf("\n");

Read : a, b

b=b-a;

a=a+b;

b=a-b;

printf("New values are \n");

b=b-a

a=a+b

b=a-b

printf("a = %d",a);

printf("\n");

printf("b = %d",b);

return 0;

Print: a,b

}

Q9. D. None of the listed options