

**JUNIOR DIVISION**

<b>1. Computer Number Systems</b>  Convert $2018_{10}$ to octal.	<b>1.</b>
<b>2. Computer Number Systems</b>  How many decimal numbers from 1 to 32 have the same number of 1's and 0's in their binary representation? Note: ignore leading zeroes.	<b>2.</b>
<b>3. Recursive Functions</b>  Find $f(18)$ given: $f(x) = \begin{cases} f(x-5)+1 & \text{if } x > 5 \\ 7 & \text{if } x = 5 \\ f(x+3)-2 & \text{if } x < 5 \end{cases}$	<b>3.</b>
<b>4. Recursive Functions</b>  Find $f(f(f(f(24))))$ given: $f(x) = \begin{cases} \lceil x/2 \rceil + 1 & \text{if } x \text{ is even} \\ \lfloor x/3 \rfloor - 2 & \text{if } x \text{ is odd} \end{cases}$ Note: $\lfloor x \rfloor$ is the greatest integer $\leq x$	<b>4.</b>

**JUNIOR DIVISION****5. What Does This Program Do? - Branching**

What is output when this program is executed?

```
a = 2 : b = 1 : c = 0 : d = 3 : e = 4
f = a + b + c + d + e
if f / 5 == a then
    f = f / 5
else
    f = a + 2
end if
if a + b < d * e / 2 then
    b = d
else
    a = e
end if
if 2 * d ↑ c == e / a then
    d = e
else
    c = a
end if
if (b < d) && (c < e) then
    b = d
else
    c = e
end if
if (c ↑ a > d * e) || (f < d / e) then
    c = a
else
    d = c
end if
output 2 * a + b * (c - d) + e / 2 * f
end
```

**5.**