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Jt Scratch Lesson 4 • Summer 2012 • slide 1

Scratch Programming

Lesson 4: Multiple Choice Decisions

Problem

- Write a script to display a letter grade based on a numeric score a student received in a class where the typical scale is used.

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Problem

- Write a script to display a letter grade based on a numeric score a student received in a class where the typical scale is used.
- For example: a 97 gets an A; a 72 gets a C

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Problem

- Write a script to display a letter grade based on a numeric score a student received in a class where the typical scale is used.
- For example: a 97 gets an A; a 72 gets a C
- Lets try out a full multimedia version of the code: [Demo: Grading](#)

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Essence of the Problem

- The script must **decide** what letter grade to assign

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Essence of the Problem

- The script must **decide** what letter grade to assign



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Essence of the Problem

- The script must **decide** what letter grade to assign
- Or put another way, it must **decide** whether or not to give an A; **decide** whether or not to give a B and so on

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Essence of the Problem

- The script must **decide** what letter grade to assign
- Or put another way, it must **decide** whether or not to give an A; **decide** whether or not to give a B and so on
- What do you use in Scratch to decide things?

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Essence of the Problem

- The script must **decide** what letter grade to assign
- Or put another way, it must **decide** whether or not to give an A; **decide** whether or not to give a B and so on
- What do you use in Scratch to decide things? **An IF or IF/ELSE**

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Essence of the Problem

- The script must decide what letter grade to assign
- Or put another way, it must decide whether or not to give an A; decide whether or not to give a B and so on
- Use an IF or IF/ELSE
- By the way, we essentially have to make a **multiple choice decision**. We will come back to this.

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The Simple Stuff

- Variable: **Score**

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The Simple Stuff

- Variable: **Score**

person's numeric score



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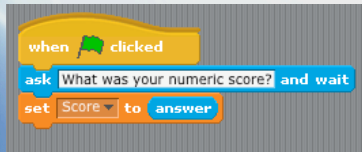
The Simple Stuff

- Variable: **Score**
- Start & Input:

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The Simple Stuff

- Variable: **Score**
- Start & Input: **Ask for Score**



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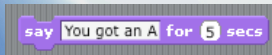
The Simple Stuff

- Variable: **Score**
- Start & Input: **Ask for Score**
- Output:

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The Simple Stuff

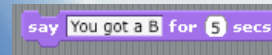
- Variable: **Score**
- Start & Input: **Ask for Score**
- Output: **Say Letter**



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The Simple Stuff

- Variable: **Score**
- Start & Input: **Ask for Score**
- Output: **Say Letter**



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The Simple Stuff

- Variable: **Score**
- Start & Input: **Ask for Score**
- Output: **Say Letter**

and so on

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The Simple Stuff

- Variable: **Score**
- Start & Input: **Ask for Score**
- Output: **Say Letter**

and so on
appropriate letter is said

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The Simple Stuff

- Variable: **Score**
- Start & Input: **Ask for Score**
- Output: **Say Letter**

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The Decisions

Variables
Score

- Decide if they get an A:

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The Decisions

Variables
Score

- Decide if they get an A:

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The Decisions

Variables
Score

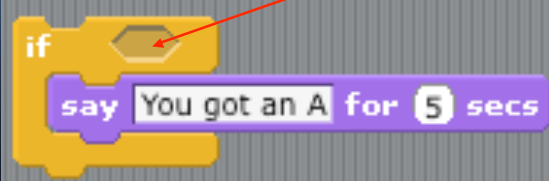
- Decide if they get an A:

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The Decisions

Variables
Score

- Decide if they get an A: appropriate condition?

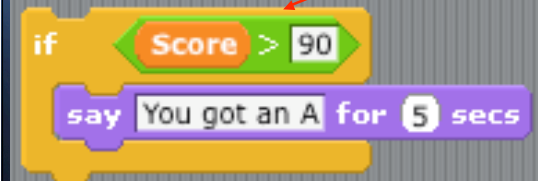


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The Decisions

Variables
Score

- Decide if they get an A:



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The Decisions

Variables
Score

- What are the rest of the decisions like?

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The Decisions

Variables
Score

- What are the rest of the decisions like?
Pretty much the same

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The Decisions

Variables
Score

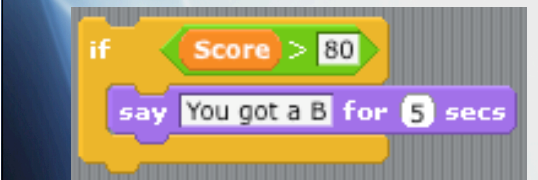
- Decide if they get an B:

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The Decisions

Variables
Score

- Decide if they get an B:

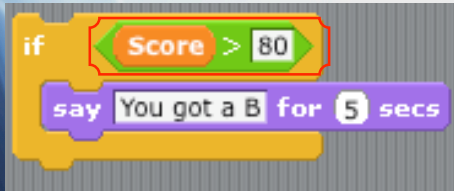


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The Decisions

Variables
Score

- Decide if they get an B:



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The Decisions

Variables
Score

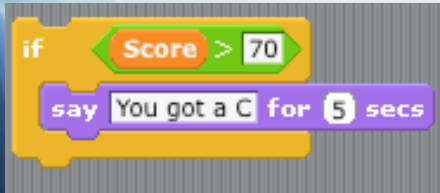
- Decide if they get an C:

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The Decisions

Variables
Score

- Decide if they get an C:

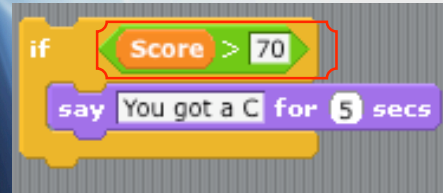


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The Decisions

Variables
Score

- Decide if they get an C:



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The Decisions

Variables
Score

- Only two letters left.

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The Decisions

Variables
Score

- Only two letters left. **What structure can we use to decide between two options?**

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The Decisions

Variables
Score


- Only two letters left. What structure can we use to **decide between two** options?

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The Decisions

Variables
Score

- Only two letters left. What structure can we use to **decide between two** options?




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The Decisions

Variables
Score

- Only two letters left.

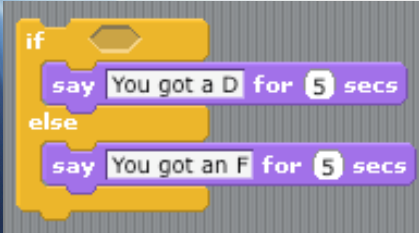


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The Decisions

Variables
Score

- Only two letters left. Condition?




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The Decisions

Variables
Score

- Only two letters left.




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The Decisions

Variables
Score

- Only two letters left.



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The Complete Script

when clicked
 ask What was your numeric score? and wait
 set Score to answer
 if Score > 90
 say You got an A for 5 secs
 if Score > 80
 say You got a B for 5 secs
 if Score > 70
 say You got a C for 5 secs
 if Score > 60
 say You got a D for 5 secs
 else
 say You got an F for 5 secs
 stop script

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The Complete Script

when clicked
 ask What was your numeric score? and wait
 set Score to answer
 if Score > 90 A?
 say You got an A for 5 secs
 if Score > 80 B?
 say You got a B for 5 secs
 if Score > 70 C?
 say You got a C for 5 secs
 if Score > 60 D?
 say You got a D for 5 secs
 else
 say You got an F for 5 secs
 stop script

Four separate IFs

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The Complete Script

when clicked
 ask What was your numeric score? and wait
 set Score to answer
 if Score > 90 A?
 say You got an A for 5 secs
 if Score > 80 B?
 say You got a B for 5 secs
 if Score > 70 C?
 say You got a C for 5 secs
 if Score > 60 D?
 say You got a D for 5 secs
 else
 say You got an F for 5 secs
 stop script

Four separate IFs

Demo: Grading 1

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Fixing the Script

- What is wrong?

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Fixing the Script

- What is wrong?
- Scripts always run all the way through.

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Fixing the Script

- What is wrong?
- Scripts always run all the way through. Just because the first IF figured out an A should be said, doesn't mean the code stops.

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Fixing the Script

- What is wrong?
- Scripts always run all the way through. Just because the first IF figured out an A should be said, doesn't mean the code stops. The code still goes on to the 2nd IF and then the 3rd and so on

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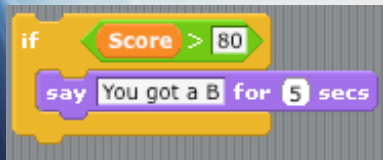
Fixing the Script

- So lets consider the 2nd decision carefully:

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Fixing the Script

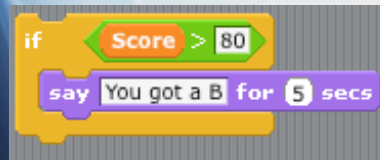
- So lets consider the 2nd decision carefully:



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Fixing the Script

- So lets consider the 2nd decision carefully:

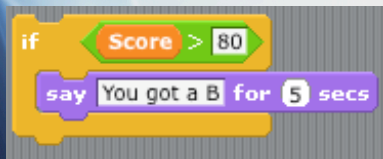


See anything wrong here?

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Fixing the Script

- So lets consider the 2nd decision carefully:

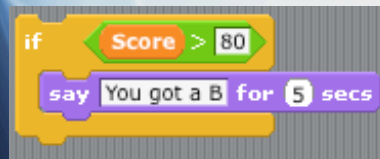


Works for 84.

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Fixing the Script

- So lets consider the 2nd decision carefully:

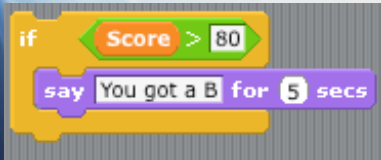


Works for 84. Works for 86.

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Fixing the Script

- So lets consider the 2nd decision carefully:

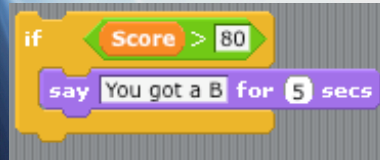


What about 92?

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Fixing the Script

- So lets consider the 2nd decision carefully:

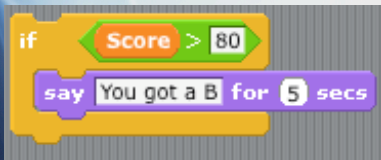


What about 92? Whoops!

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Fixing the Script

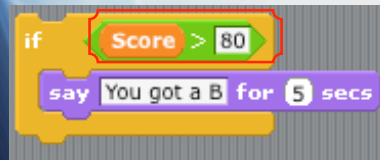
- We have not been precise enough.



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Fixing the Script

- We have not been precise enough.

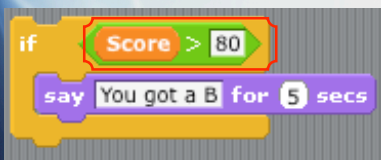


The condition is not exactly right.

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Fixing the Script

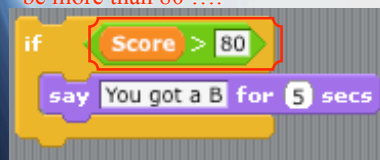
- What must be true about the score?



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Fixing the Script

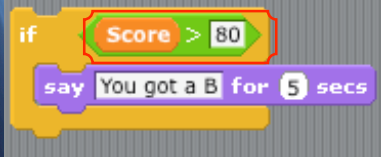
- What must be true about the score? Yes it must be more than 80



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Fixing the Script

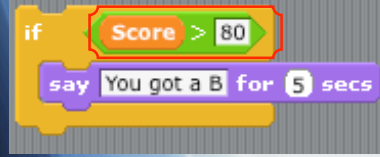
- What must be true about the score? **Yes it must be more than 80 but also less than 90**



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Fixing the Script

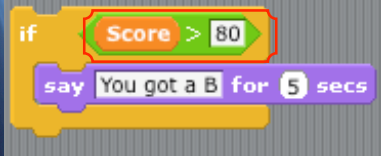
- Yes it must be more than 80 but also less than 90. **Both of these conditions must be true.**



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Fixing the Script

- Yes it must be more than 80 but also less than 90. **Both of these conditions must be true.**

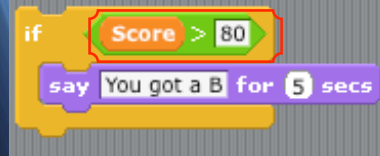


What do you use to combine two conditions together ...

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Fixing the Script

- Yes it must be more than 80 but also less than 90. **Both of these conditions must be true.**

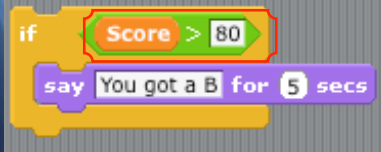


What do you use to combine two conditions together ... and both must be true?

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Fixing the Script

- Yes it must be more than 80 but also less than 90. **Both of these conditions must be true.**

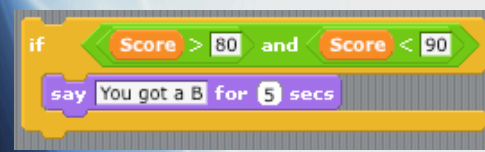


Use an AND

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Fixing the Script

- Yes it must be more than 80 but also less than 90. **Both of these conditions must be true.**



Use an AND

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Fixing the Script

- Yes it must be more than 80 but also less than 90. Both of these conditions must be true.

```
if (Score > 80 and Score < 90) {
  say You got a B for 5 secs
}
```

Use an AND

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Fixing the Script

- Lets adjust the other two conditions also

Fixing the Script

- Lets adjust the other two conditions also
a C is above 70 but also less than 80

```
if (Score > 70 and Score < 80) {
  say You got a C for 5 secs
}
```

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Fixing the Script

- Lets adjust the other two conditions also
a D is above 60 but also less than 70

```
if (Score > 60 and Score < 70) {
  say You got a D for 5 secs
} else {
  say You got an F for 5 secs
}
stop script
```

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Revised Script

```
when clicked
ask What was your numeric score? and wait
set Score to answer
if (Score > 90) {
  say You got an A for 5 secs
}
if (Score > 80 and Score < 90) {
  say You got a B for 5 secs
}
if (Score > 70 and Score < 80) {
  say You got a C for 5 secs
}
if (Score > 60 and Score < 70) {
  say You got a D for 5 secs
} else {
  say You got an F for 5 secs
}
stop script
```

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Revised Script

```
when clicked
ask What was your numeric score? and wait
set Score to answer
if (Score > 90) {
  say You got an A for 5 secs
}
if (Score > 80 and Score < 90) {
  say You got a B for 5 secs
}
if (Score > 70 and Score < 80) {
  say You got a C for 5 secs
}
if (Score > 60 and Score < 70) {
  say You got a D for 5 secs
} else {
  say You got an F for 5 secs
}
stop script
```

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Revised Script

Demo:
Grading 2

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Fixing the Script Again

- Close but not quite.

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Fixing the Script Again

- Close but not quite. **Now what is wrong?**

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Fixing the Script Again

- Close but not quite. Now what is wrong?
Remember, just because an earlier IF is true and causes a grade to be said - this doesn't mean the script stops.

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Fixing the Script Again

- Close but not quite. Now what is wrong?
Remember, just because an earlier IF is true and causes a grade to be said - this doesn't mean the script stops. **It eventually makes it to the 4th decision (IF) where the F seems to be said too.**

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Fixing the Script Again

- Close but not quite. Now what is wrong?
Remember, just because an earlier IF is true and causes a grade to be said - this doesn't mean the script stops. **It eventually makes it to the 4th decision (IF) where the F seems to be said too. Why?**

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Fixing the Script Again

- Even after the A is said, it still eventually makes it to the 4th decision (IF) where the F seems to be said too. **Let's look at this 4th IF.**

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Fixing the Script Again

- Even after the A is said, it still eventually makes it to the 4th decision (IF) where the F seems to be said too. **Let's look at this 4th IF.**

```
if Score > 60 and Score < 70
  say You got a D for 5 secs
else
  say You got an F for 5 secs
stop script
```

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Fixing the Script Again

- Its an IF/ELSE.

```
if Score > 60 and Score < 70
  say You got a D for 5 secs
else
  say You got an F for 5 secs
stop script
```

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Fixing the Script Again

- Its an IF/ELSE. **Is it ever possible for an IF/ELSE to do nothing?**

```
if Score > 60 and Score < 70
  say You got a D for 5 secs
else
  say You got an F for 5 secs
stop script
```

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Fixing the Script Again

- Its an IF/ELSE. Is it ever possible for an IF/ELSE to do nothing? **NO!**

```
if Score > 60 and Score < 70
  say You got a D for 5 secs
else
  say You got an F for 5 secs
stop script
```

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Fixing the Script Again

- Its an IF/ELSE. Is it ever possible for an IF/ELSE to do nothing? **NO! It always does one of its two parts.**

```
if Score > 60 and Score < 70
  say You got a D for 5 secs
else
  say You got an F for 5 secs
stop script
```

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Fixing the Script Again

- Is it ever possible for an IF/ELSE to do nothing? NO! It always does one of its two parts. So either a D or F will always print !

```
if <Score > 60 and <Score < 70>
  say You got a D for 5 secs
else
  say You got an F for 5 secs
stop script
```

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Fixing the Script Again

- So either a D or F will always print ! Every time we run this script, no matter what else it does - a D or F will always be the last item to print.

```
if <Score > 60 and <Score < 70>
  say You got a D for 5 secs
else
  say You got an F for 5 secs
stop script
```

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Fixing the Script Again

- How can we fix this?

```
if <Score > 60 and <Score < 70>
  say You got a D for 5 secs
else
  say You got an F for 5 secs
stop script
```

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Fixing the Script Again

- How can we fix this? Lets not use and IF/ELSE.

```
if <Score > 60 and <Score < 70>
  say You got a D for 5 secs
else
  say You got an F for 5 secs
stop script
```

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Fixing the Script Again

- How can we fix this? Lets not use and IF/ELSE. We can break this into two separate regular IFs (like we did for the earlier grades.)

```
if <Score > 60 and <Score < 70>
  say You got a D for 5 secs
else
  say You got an F for 5 secs
stop script
```

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Fixing the Script Again

- Two separate regular IFs.

```
if <Score > 60 and <Score < 70>
  say You got a D for 5 secs

if <Score < 60>
  say You got an F for 5 secs

stop script
```

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Fixing the Script Again

- Two separate regular IFs. **No ELSE used.**

```
when clicked
ask What was your numeric score? and wait
set Score to answer
if Score > 60 and Score < 70
say You got a D for 5 secs
if Score < 60
say You got an F for 5 secs
stop script
```

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Latest Script

```
when clicked
ask What was your numeric score? and wait
set Score to answer
if Score > 90
say You got an A for 5 secs
if Score > 80 and Score < 90
say You got a B for 5 secs
if Score > 70 and Score < 80
say You got a C for 5 secs
if Score > 60 and Score < 70
say You got a D for 5 secs
if Score < 60
say You got an F for 5 secs
stop script
```

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Latest Script

Five Separate IFs

```
when clicked
ask What was your numeric score? and wait
set Score to answer
if Score > 90 1. A?
say You got an A for 5 secs
if Score > 80 and Score < 90 2. B?
say You got a B for 5 secs
if Score > 70 and Score < 80 3. C?
say You got a C for 5 secs
if Score > 60 and Score < 70 4. D?
say You got a D for 5 secs
if Score < 60 5. F?
say You got an F for 5 secs
stop script
```

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Latest Script

Five Separate Ifs

Three of them had to use ANDs

```
when clicked
ask What was your numeric score? and wait
set Score to answer
if Score > 90 1. A?
say You got an A for 5 secs
if Score > 80 and Score < 90 2. B?
say You got a B for 5 secs
if Score > 70 and Score < 80 3. C?
say You got a C for 5 secs
if Score > 60 and Score < 70 4. D?
say You got a D for 5 secs
if Score < 60 5. F?
say You got an F for 5 secs
stop script
```

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Latest Script

Five Separate Ifs

Three of them had to use ANDs

Bit more complicated than our first attempt.

```
when clicked
ask What was your numeric score? and wait
set Score to answer
if Score > 90 1. A?
say You got an A for 5 secs
if Score > 80 and Score < 90 2. B?
say You got a B for 5 secs
if Score > 70 and Score < 80 3. C?
say You got a C for 5 secs
if Score > 60 and Score < 70 4. D?
say You got a D for 5 secs
if Score < 60 5. F?
say You got an F for 5 secs
stop script
```

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Latest Script

Demo:
Grading 3

```
when clicked
ask What was your numeric score? and wait
set Score to answer
if Score > 90 1. A?
say You got an A for 5 secs
if Score > 80 and Score < 90 2. B?
say You got a B for 5 secs
if Score > 70 and Score < 80 3. C?
say You got a C for 5 secs
if Score > 60 and Score < 70 4. D?
say You got a D for 5 secs
if Score < 60 5. F?
say You got an F for 5 secs
stop script
```

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The image shows a Scratch script for grading a numeric score. It starts with a 'when clicked' event, followed by an 'ask' block: 'What was your numeric score? and wait'. Then, a 'set' block: 'Score = [] to answer'. The script then uses five 'if' blocks to check for letter grades:

- if Score > 90: 1. A? (say 'You got an A! for 5 secs')
- if Score > 80 and Score < 90: 2. B? (say 'You got a B! for 5 secs')
- if Score > 70 and Score < 80: 3. C? (say 'You got a C! for 5 secs')
- if Score > 60 and Score < 70: 4. D? (say 'You got a D! for 5 secs')
- if Score < 60: 5. F? (say 'You got an F! for 5 secs')

 The script ends with a 'stop script' block.

Latest Script

**Demo:
Grading 3**

It finally works right.

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Reviewing The Issue

- There was a fairly simple problem. Assign a letter grade given a numeric score.
- Our original code seemed simple enough. But the simple approach just didn't work well.
- In the end, to get it to work right, we needed five separate IF statements, many of which needed to use AND conditions.

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Reviewing The Issue

- There was a fairly simple problem. Assign a letter grade given a numeric score.
- Our original code seemed simple enough. But the simple approach just didn't work well.
- In the end, to get it to work right, we needed five separate IF statements, many of which needed to use AND conditions.
- Why?**

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Insight

- The main issue is each IF is a separate statement - each making its own decision. So, that means more than one of them can come out TRUE.

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Insight

- The main issue is each IF is a separate statement - each making its own decision. So, that means more than one of them can come out TRUE.
- But, we don't want more than one to be TRUE.

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Insight

- The main issue is each IF is a separate statement - each making its own decision. So, that means more than one of them can come out TRUE.
- But, we don't want more than one to be TRUE.
- We have a five way decision. We want exactly one of five possible grades to be assigned.

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Insight

- The main issue is each IF is a separate statement - each making its own decision. So, that means more than one of them can come out TRUE.
- But, we don't want more than one to be TRUE.
- We have a five way decision. We want exactly one of five possible grades to be assigned.
- Yet, IF/ELSEs by their nature, can only make a two way decision.

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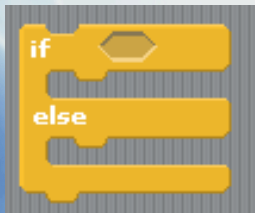
Another Approach

- Lets look at the skeleton of an IF/ELSE that makes a two-way decision but assigns the right grade.

Jt Scratch Lesson 4 • Summer 2012 • slide 104

Another Approach

- Lets look at the skeleton of an IF/ELSE that makes a two-way decision but assigns the right grade.



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Another Approach

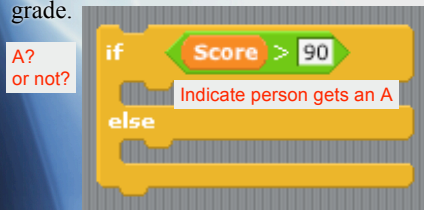
- Lets look at the skeleton of an IF/ELSE that makes a two-way decision but assigns the right grade.



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Another Approach

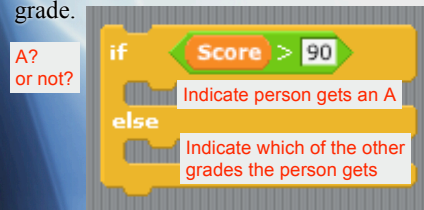
- Lets look at the skeleton of an IF/ELSE that makes a two-way decision but assigns the right grade.



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Another Approach

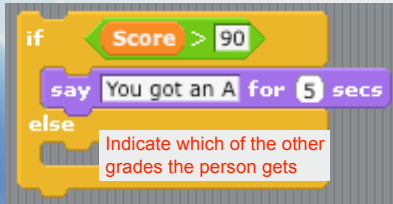
- Lets look at the skeleton of an IF/ELSE that makes a two-way decision but assigns the right grade.



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Another Approach

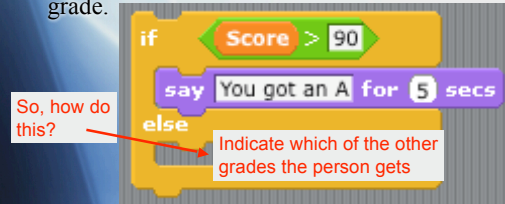
- Lets look at the skeleton of an IF/ELSE that makes a two-way decision but assigns the right grade.



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Another Approach

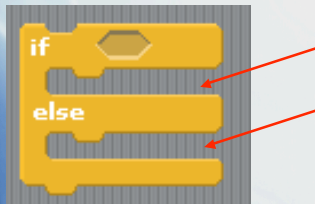
- Lets look at the skeleton of an IF/ELSE that makes a two-way decision but assigns the right grade.



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Side Lesson

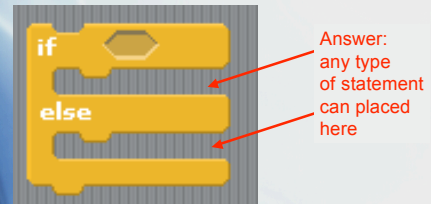
- What statements can you place inside the sections of an IF/ELSE statement?



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Side Lesson

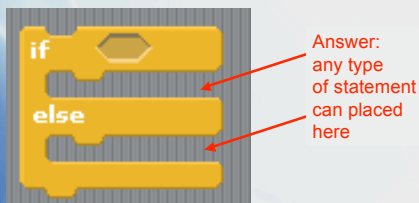
- What statements can you place inside the sections of an IF/ELSE statement?



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Side Lesson

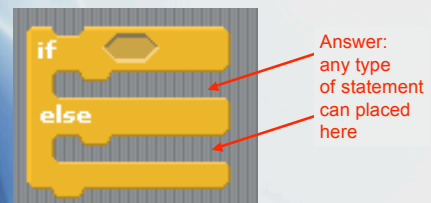
- But an IF statement is a type of statement.



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Side Lesson

- But an IF statement is a type of statement. So an IF can be placed inside another IF.



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Example: Problem

- Tuesday is a special day at a movie theater. Everyone gets in for \$6, gets a free drink of their choice, and kids under 10 years old, get a free gift.

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Example : Code Segment

- Tuesday is a special day at a movie theater. Everyone gets in for \$6, gets a free drink of their choice, and kids under 10 years old, get a free gift.

```
if DayOfWeek = Tuesday
  set AdmissionPrice to 6
  ask What kind of drink do you want? and wait
  set SodaType to answer
  Give Toy To Kids
```

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Example : Focus on Toy

- Not everyone gets the toy.

Jt Scratch Lesson 4 • Summer 2012 • slide 117

Example : Focus on Toy

- Not everyone gets the toy. **You only give it to some people.**

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Example : Focus on Toy

- Not everyone gets the toy. You only give it to some people. You have to **decide** to give it or not.

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Example : Focus on Toy

- Not everyone gets the toy. You only give it to some people. You have to **decide** to give it or not. **What do you use in Scratch to make a decision?**

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Example : Focus on Toy

- Not everyone gets the toy. You only give it to some people. You have to **decide** to give it or not. What do you use in Scratch to make a decision? Use **an IF**.

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Example : Focus on Toy

- Use an IF. **What is our condition? What has to be true about the person for them to get a toy?**

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Example : Focus on Toy

- Use an IF. **What is our condition? What has to be true about the person for them to get a toy?**

```
if (PersonsAge < 10) {
  say "Enjoy this free toy." for 2 secs
}
```

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Example : Code Segment

- Tuesday is a special day at a movie theater. Everyone gets in for \$6, gets a free drink of their choice, and kids under 10 years old, get a free gift.

```
if (DayOfWeek = Tuesday) {
  set AdmissionPrice to 6
  ask "What kind of drink do you want?" and wait
  set SodaType to answer
  Give Toy To Kids
}
```

Back to our main theater code

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Example : Code Segment

- Tuesday is a special day at a movie theater. Everyone gets in for \$6, gets a free drink of their choice, and kids under 10 years old, get a free gift.

We have to use the code we just created for the toy here

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Example : Code Segment

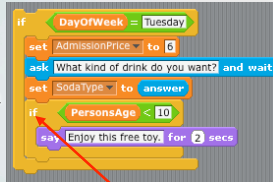
- Tuesday is a special day at a movie theater. Everyone gets in for \$6, gets a free drink of their choice, and kids under 10 years old, get a free gift.

We have to use the code we just created for the toy here

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Example : Code Segment

- Tuesday is a special day at a movie theater. Everyone gets in for \$6, gets a free drink of their choice, and kids under 10 years old, get a free gift.

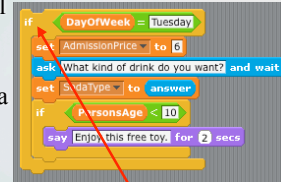


Here we have an IF

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Example : Code Segment

- Tuesday is a special day at a movie theater. Everyone gets in for \$6, gets a free drink of their choice, and kids under 10 years old, get a free gift.



Here we have an IF inside another IF

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Example : Code Segment

- Tuesday is a special day at a movie theater. Everyone gets in for \$6, gets a free drink of their choice, and kids under 10 years old, get a free gift.

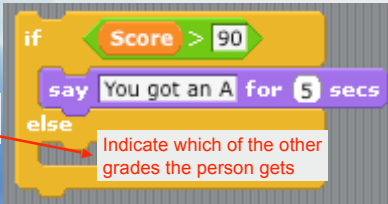


This is called a nested IF

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Back To Grading

- Lets look at the skeleton of an IF/ELSE that makes a two-way decision but assigns the right grade.



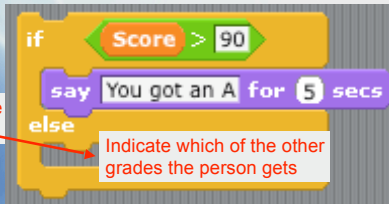
So, how do this?

Indicate which of the other grades the person gets

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Back To Grading

- Lets look at the skeleton of an IF/ELSE that makes a two-way decision but assigns the right grade.



We can use a nested IF.

Indicate which of the other grades the person gets

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Back To Grading

- Put code for other grades in the ELSE section of our A? IF.

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Back To Grading

- Put code for other grades in the ELSE section of our A? IF.

```
if (Score > 90) {
  say "You got an A for 5 secs"
} else {
  if (Score > 80) {
    say "You got a B for 5 secs"
  } else {
    give other grade
  }
}
```

Code for all other grades: Either a B or the rest

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Back To Grading

- This is a nested IF.

```
if (Score > 90) {
  say "You got an A for 5 secs"
} else {
  if (Score > 80) {
    say "You got a B for 5 secs"
  } else {
    give other grade
  }
}
```

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Back To Grading

- This is a nested IF. You can nest more than once.

```
if (Score > 90) {
  say "You got an A for 5 secs"
} else {
  if (Score > 80) {
    say "You got a B for 5 secs"
  } else {
    if (Score > 70) {
      say "You got a C for 5 secs"
    } else {
      give other grade
    }
  }
}
```

Code to give C or other grade

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Back To Grading

- This is a nested IF. You can nest more than once.

```
if (Score > 90) {
  say "You got an A for 5 secs"
} else {
  if (Score > 80) {
    say "You got a B for 5 secs"
  } else {
    if (Score > 70) {
      say "You got a C for 5 secs"
    } else {
      give other grade
    }
  }
}
```

Nest it

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Back To Grading

- This is an IF inside an IF inside an IF.

```
if (Score > 90) {
  say "You got an A for 5 secs"
} else {
  if (Score > 80) {
    say "You got a B for 5 secs"
  } else {
    if (Score > 70) {
      say "You got a C for 5 secs"
    } else {
      give other grade
    }
  }
}
```

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Back To Grading

- One last time:

```
if (Score > 90) {
  say "You got an A for 5 secs"
} else {
  if (Score > 80) {
    say "You got a B for 5 secs"
  } else {
    if (Score > 70) {
      say "You got a C for 5 secs"
    } else {
      give other grade
    }
  }
}
```

Give D or F

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Back To Grading

- One last time:

Jt Scratch Lesson 4 • Summer 2012 • slide 139

Back To Grading

- One last time:

Jt Scratch Lesson 4 • Summer 2012 • slide 140

Back To Grading

- One last time:

- Note: This is one big IF statement

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Back To Grading

- One last time:

- Note: This is one big IF statement

- Not five separate statements like before

Jt Scratch Lesson 4 • Summer 2012 • slide 142

Back To Grading

- One last time:

- Note: This is one big IF statement

- Not five separate statements like before

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Back To Grading

- Note: This is one big IF statement

- As such, it is impossible for more than one grade to be assigned.

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Back To Grading

- Note: This is one big IF statement
- As such, it is impossible for more than one grade to be assigned.
- The one main IF either Says A or (else section) assigns one other grade

```
if (Score > 80)
  say "You got an A" for 5 secs
else
  if (Score > 70)
    say "You got a B" for 5 secs
  else
    if (Score > 60)
      say "You got a C" for 5 secs
    else
      if (Score > 50)
        say "You got a D" for 5 secs
      else
        say "You got an F" for 5 secs
```

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Back To Grading

- Note: This is one big IF statement
- No ANDs needed.

```
if (Score > 90)
  say "You got an A" for 5 secs
else
  if (Score > 80)
    say "You got a B" for 5 secs
  else
    if (Score > 70)
      say "You got a C" for 5 secs
    else
      if (Score > 60)
        say "You got a D" for 5 secs
      else
        say "You got an F" for 5 secs
```

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Complete Code

```
when clicked
  ask "What was your numeric score?" and wait
  set Score to answer
  if (Score > 90)
    say "You got an A" for 5 secs
  else
    if (Score > 80)
      say "You got a B" for 5 secs
    else
      if (Score > 70)
        say "You got a C" for 5 secs
      else
        if (Score > 60)
          say "You got a D" for 5 secs
        else
          say "You got an F" for 5 secs
  stop script
```

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Complete Code

Demo:
Grading 4

```
when clicked
  ask "What was your numeric score?" and wait
  set Score to answer
  if (Score > 90)
    say "You got an A" for 5 secs
  else
    if (Score > 80)
      say "You got a B" for 5 secs
    else
      if (Score > 70)
        say "You got a C" for 5 secs
      else
        if (Score > 60)
          say "You got a D" for 5 secs
        else
          say "You got an F" for 5 secs
  stop script
```

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Main Point

- We already knew you use a regular IF if you want to choose between doing something or skipping it.

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Main Point

- We already knew you use a regular IF if you want to choose between doing something or skipping it.
- And, if you need to choose between two things to do, and you definitely want to do one of those two things, you use an IF/ELSE

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Main Point

- We already knew you use a regular IF if you want to choose between doing something or skipping it.
- And, if you need to choose between two things to do, and you definitely want to do one of those two things, you use an IF/ELSE
- Now we know, if you have more than two choices - a multiple choice decision - and you want to do exactly one of the choices, then use NESTED IFs

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Main Point

For multiple choice decisions, use NESTED IFs

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One Last Fix

- Most people think of exactly 90 as an A, and exactly an 80 as a B.
- What does our code do? Lets go see.

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One Last Fix

- Most people think of exactly 90 as an A, and exactly an 80 as a B.
- What does our code do? Lets go see.
- Some of you already noticed this.
- How do we fix this?

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One Last Fix

- Most programming languages have more relational operators, similar to what you learned long ago in math class. Like:

IF Score \geq 90

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One Last Fix

- Most programming languages have more relational operators, similar to what you learned long ago in math class. Like: Score \geq 90
- Scratch does not. So we have to use the logical operators.

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One Last Fix

- Most programming languages have more relational operators, similar to what you learned long ago in math class. Like: `Score >= 90`
- Scratch does not. So we have to use the logical operators.
- For example, assign an A when the grade is over 90 or when the grade is exactly 90.

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One Last Fix

- Most programming languages have more relational operators, similar to what you learned long ago in math class. Like: `Score >= 90`
- Scratch does not. So we have to use the logical operators.
- For example, assign an A when the grade is over 90 or when the grade is exactly 90.
- If either one of those two possibilities is true, we should give an A.

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One Last Fix

- For example, assign an A when the grade is over 90 or when the grade is exactly 90.
- If either one of those two possibilities is true, we should give an A.
- What logical (boolean) operator do you use when just one of two possibilities has to be true?

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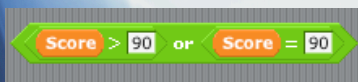
One Last Fix

- For example, assign an A when the grade is over 90 or when the grade is exactly 90.
- If either one of those two possibilities is true, we should give an A.
- What logical (boolean) operator do you use when just one of two possibilities has to be true? **OR**

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One Last Fix

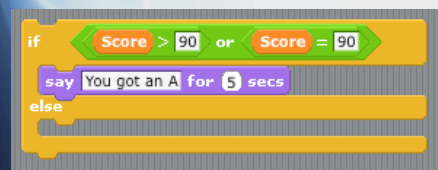
- For example, assign an A when the grade is over 90 or when the grade is exactly 90.
- If either one of those two possibilities is true, we should give an A.
- What logical (boolean) operator do you need just one of two possibilities has to be true? **OR**



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One Last Fix

- For example, assign an A when the grade is over 90 or when the grade is exactly 90.



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Code to Handle Exact Scores

Notice ORs

```

when clicked
ask What was your numeric score? and wait
set Score to answer
if Score > 90 or Score = 90
say You got an A for 5 secs
else
if Score > 80 or Score = 80
say You got a B for 5 secs
else
if Score > 70 or Score = 70
say You got a C for 5 secs
else
if Score > 60 or Score = 60
say You got a D for 5 secs
else
say You got an F for 5 secs
stop script
  
```

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Code to Handle Exact Scores

Notice ORs

```

when clicked
ask What was your numeric score? and wait
set Score to answer
if Score > 90 or Score = 90
say You got an A for 5 secs
else
if Score > 80 or Score = 80
say You got a B for 5 secs
else
if Score > 70 or Score = 70
say You got a C for 5 secs
else
if Score > 60 or Score = 60
say You got a D for 5 secs
else
say You got an F for 5 secs
stop script
  
```

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Code to Handle Exact Scores

Notice ORs

Demo:
Grading 5

```

when clicked
ask What was your numeric score? and wait
set Score to answer
if Score > 90 or Score = 90
say You got an A for 5 secs
else
if Score > 80 or Score = 80
say You got a B for 5 secs
else
if Score > 70 or Score = 70
say You got a C for 5 secs
else
if Score > 60 or Score = 60
say You got a D for 5 secs
else
say You got an F for 5 secs
stop script
  
```

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Adding Multimedia

- Stage

Ji Scratch Lesson 4 • Summer 2012 • slide 166

Adding Multimedia

- Stage
- Costumes

Ji Scratch Lesson 4 • Summer 2012 • slide 167

Adding Multimedia

- Stage
- Costumes
- Sounds

Ji Scratch Lesson 4 • Summer 2012 • slide 168

Adding Multimedia

- Change costume, play appropriate sound when grade is assigned.

```
if (Score > 90 or Score = 90)
  switch to costume A
  play sound HeavenlyChoir-Op
  say You got an A for 5 secs
else
```

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Code With Multimedia Included

```
when clicked
  ask What was your numeric score? and wait
  set Score to answer
  if Score > 90 or Score = 90
    switch to costume A
    play sound HeavenlyChoir-Op
    say You got an A for 5 secs
  else
    if Score > 80 or Score = 80
      switch to costume B
      play sound 5-DrumMachine
      say You got an B for 5 secs
    else
      if Score > 70 or Score = 70
        switch to costume C
        play sound 5-DrumMachine
        say You got an C for 5 secs
      else
        if Score > 60 or Score = 60
          switch to costume D
          play sound 5-DrumMachine
          say You got an D for 5 secs
        else
          if Score > 50 or Score = 50
            switch to costume E
            play sound 5-DrumMachine
            say You got an E for 5 secs
          else
            if Score > 40 or Score = 40
              switch to costume F
              play sound 5-DrumMachine
              say You got an F for 5 secs
            else
              if Score > 30 or Score = 30
                switch to costume G
                play sound 5-DrumMachine
                say You got an G for 5 secs
              else
                if Score > 20 or Score = 20
                  switch to costume H
                  play sound 5-DrumMachine
                  say You got an H for 5 secs
                else
                  if Score > 10 or Score = 10
                    switch to costume I
                    play sound 5-DrumMachine
                    say You got an I for 5 secs
                  else
                    if Score > 0 or Score = 0
                      switch to costume J
                      play sound 5-DrumMachine
                      say You got an J for 5 secs
                    else
                      say You got a score of 0 for 5 secs
  stop script
```

Jt Scratch Lesson 4 • Summer 2012 • slide 170

Code With Multimedia Included

Demo:
Grading

```
when clicked
  ask What was your numeric score? and wait
  set Score to answer
  if Score > 90 or Score = 90
    switch to costume A
    play sound HeavenlyChoir-Op
    say You got an A for 5 secs
  else
    if Score > 80 or Score = 80
      switch to costume B
      play sound 5-DrumMachine
      say You got an B for 5 secs
    else
      if Score > 70 or Score = 70
        switch to costume C
        play sound 5-DrumMachine
        say You got an C for 5 secs
      else
        if Score > 60 or Score = 60
          switch to costume D
          play sound 5-DrumMachine
          say You got an D for 5 secs
        else
          if Score > 50 or Score = 50
            switch to costume E
            play sound 5-DrumMachine
            say You got an E for 5 secs
          else
            if Score > 40 or Score = 40
              switch to costume F
              play sound 5-DrumMachine
              say You got an F for 5 secs
            else
              if Score > 30 or Score = 30
                switch to costume G
                play sound 5-DrumMachine
                say You got an G for 5 secs
              else
                if Score > 20 or Score = 20
                  switch to costume H
                  play sound 5-DrumMachine
                  say You got an H for 5 secs
                else
                  if Score > 10 or Score = 10
                    switch to costume I
                    play sound 5-DrumMachine
                    say You got an I for 5 secs
                  else
                    if Score > 0 or Score = 0
                      switch to costume J
                      play sound 5-DrumMachine
                      say You got an J for 5 secs
                    else
                      say You got a score of 0 for 5 secs
  stop script
```

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