



BEHIND THE SCREEN:
NEURODEVELOPMENT
BEHIND EXCESSIVE
SCREEN TIME



Lethbridge School Division Digital Wellness

WHAT DO YOU:



See - THINK - Wonder



Students, write your response!



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Behind the Screen: The Neurodevelopment Behind Excessive Screen Time

<p> Lethbridge School Division </p>

Breakdown of Presentation.



01

KKW Model



02

Gaming



03

Social Media
+ Chronic
Tech Use



04

Norepinephrine



05

Action
Plan/Takeaways



06

Communication
points



01 KKW Model

Explaining the different stages of human response to environmental stimuli.

Thought that humans go through **5 stages**.

Perception (Physical Feeling)

Perception, involves receiving and interpreting information from the environment through our sense.

Interpretation (Thoughts)

Interpretation involves making sense of the information we have perceived and assigning meaning to it base on our past experiences or beliefs.

Emotion (fear, happiness, etc)

Emotion involves experiencing a subjective emotional response to the interpreted information.

Behaviour (Response)

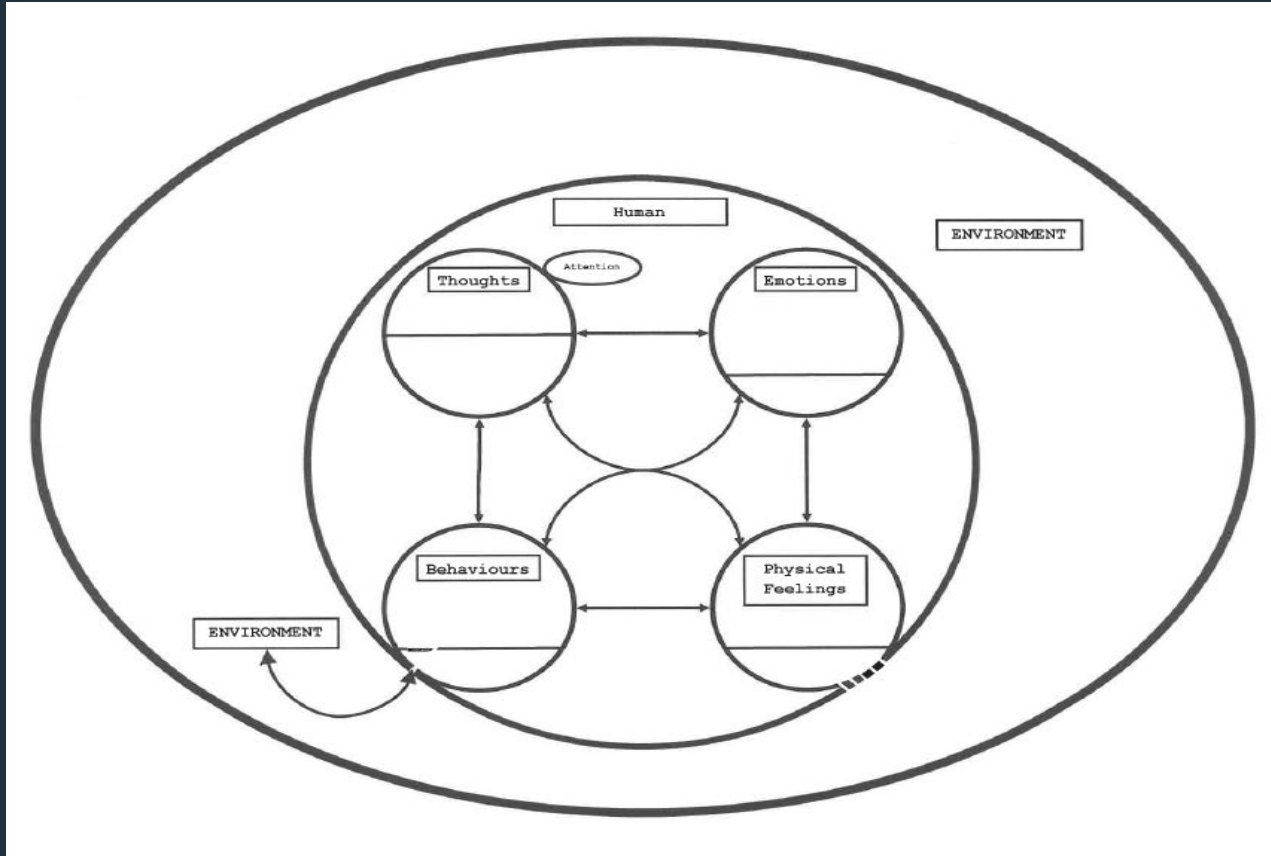
Behaviour which involves engaging in an action or response based on the perceived information and emotional response.

Feedback (Positive/Negative)

Feedback which involves receiving information about the outcome of the behaviour and using that information to adjust future responses.

of response

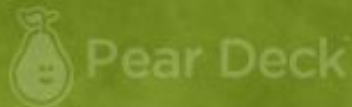
●●● KKW Model



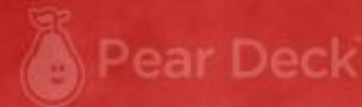
Kennyley, M., Kirk, R. E., & Westbrook, J. D. (1983). The KKW model: A model for describing the dynamics of human response to environmental stimuli. *Journal of Environmental Systems*, 13(2), 95-112.

ACCORDING THE TO KKW MODEL, THE RESPONSE TO ENVIRONMENTAL STIMULI IS: PHYSICAL, INTERPRETATION, EMOTION, FEEDBACK, AND BEHAVIOR?

True




False



Students choose an option

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02 Let's Talk About Neurotransmitters

Excessive gaming and technology use
increases the buildup and release of
Neurotransmitters.

Let's Talk About Your Brain

Quick Breakdown

- 🧠 The human brain takes approximately 27-32 years to fully mature.
- 🧠 Ages 12-20 is noted to be the Neurological (synaptic) pruning stage in development.
- 🧠 Crucial for improving cognitive functioning, memory, and overall brain health.
- 🧠 Efficiency & Adaptability.
- 🧠 Becoming a complex, refined, and abstract thinker.



What is the Amygdala?

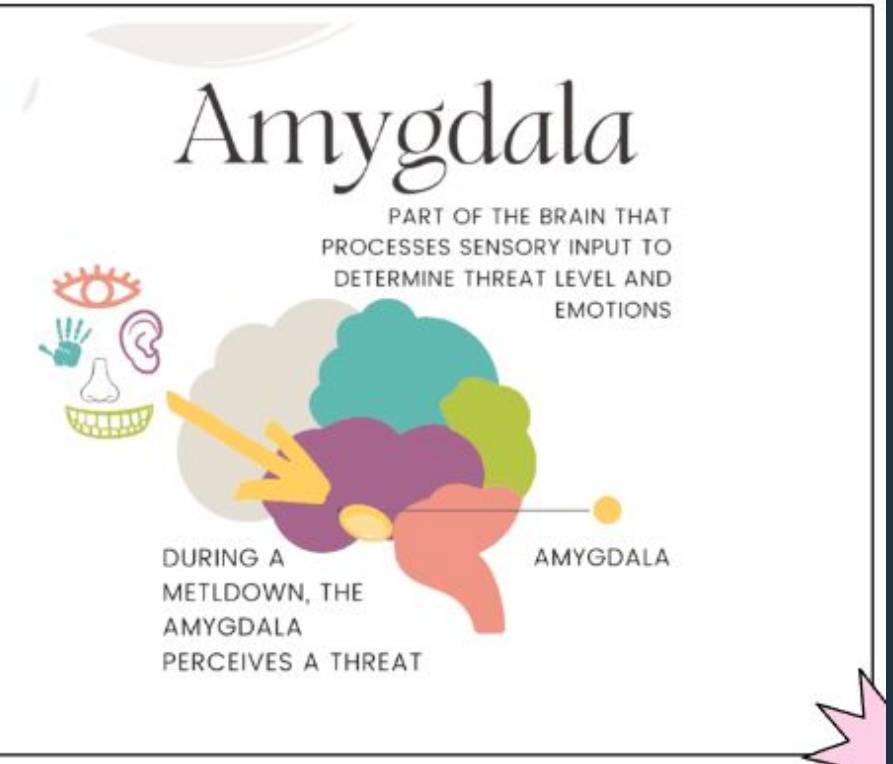
Amygdala



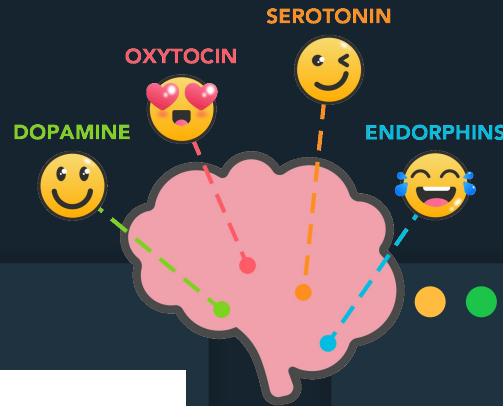
Amygdala- The part of the Brain that helps us feel emotions. (happy, fear, sad, etc.)



Excessive screen time can lead to a buildup of neurotransmitters in our brains, such as **dopamine** and **norepinephrine**.



D.O.S.E.



D *Dopamine*

The REWARD Chemical

- Complete a task
- Eat good food
- Self-Care

O *Oxytocin*

The LOVE Hormone

- Give a compliment
- Hug a loved one
- Play with your pet

S *Serotonin*

The MOOD Stabilizer

- Meditate
- Enjoy the Sunshine
- Outdoor Exercise



E *Endorphins*

The PAIN Killer

- Laughter
- Eat Spicy Food
- Exercise

Dopamine







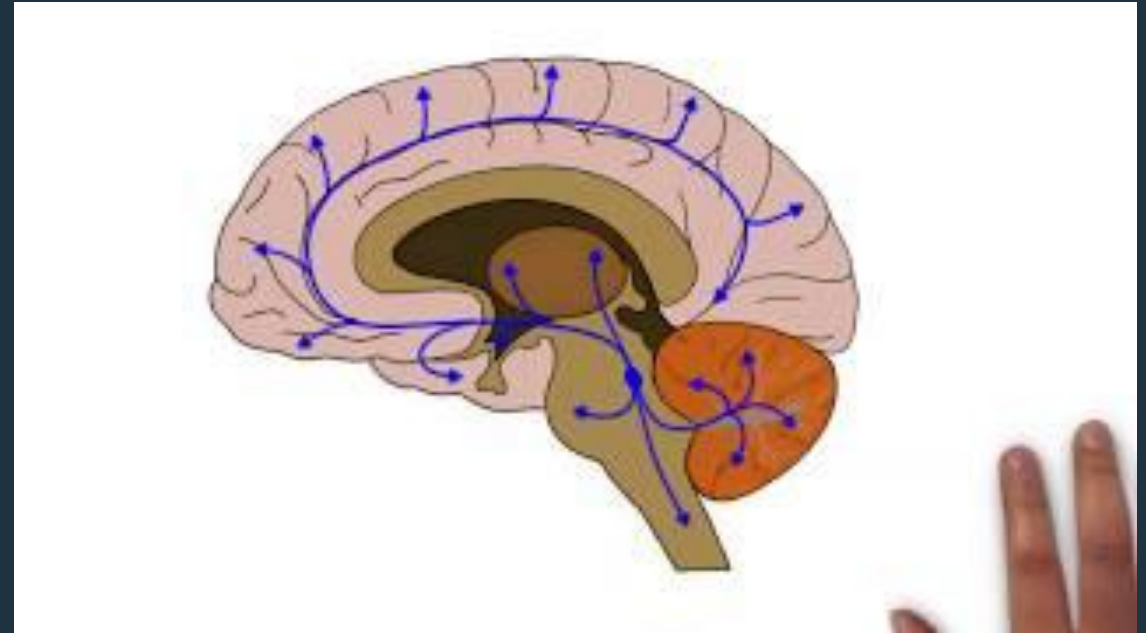
The reward chemical in our brains.

- New and surprising things on digital media ignite the release of dopamine.
- Talking with others and connecting can also bring a dopamine release
- Streaks, likes, requests, notifications, and digital advancements all contribute to a high level of dopamine release.

What is Norepinephrine?







-  Chemical naturally produced in the brain and body.
-  Helps one respond to stressful situations and danger.
-  Aids in maintaining our focus, alertness, and regulates our mood.
-  Important chemical that helps us respond to stress and stay focused.







Difference between:

Norepinephrine

-  Primarily responsible for increasing heart rate and blood pressure.
-  Potency: Less potent in increasing heart rate and blood pressure.
-  Released from CNS and acts locally.
-  Chemical aided to responses and focus

Epinephrine

-  Wider range of effects, including dilating air passages in the lungs and increasing blood sugar levels.
-  Potency: 10x more potent.
-  Released from adrenal glands and circulates throughout the body, affecting multiple organs.
-  Active body's stress response and prepare for appropriate action.

Build up of excessive Norepinephrine



When one is playing video games or scrolling on a phone or in a digital space, our brain can become overstimulated and release excessive amount of norepinephrine.

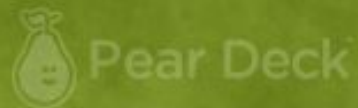
This excessive amount of release has potential to have negative effects on our body including:

1. Increased anxiety
2. Reduced sleep quality
3. Physical stress
4. Decreased productivity

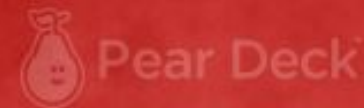


NOREPINEPHRINE'S OBJECT IS TO AID IN FOCUS, EMOTIONAL REGULATION, AND RESPONSE TO OUR BODIES ENVIRONMENTS?

True



False



Students choose an option



03 Let's Talk About Gaming

<p> Our brains tend to remember the start and the end of things but not much in between: Serial Position Effect. </p>

What is Serial Position Effect?

● ● ● Primary effect

The first items in a list are more likely to be remembered because they have a greater opportunity to be rehearsed and encoded into the long-term memory.

Recency effect

The last items in a list are also more likely to be remembered because they are still in our working memory when we try to recall the information.

Interference

The items in the middle of a list are more likely to be forgotten because they are more likely to be interred with by other information that is ongoing.

Attention

Our attention tends to be focused more on the beginning and end of an event or experience, which can make those part more memorable.



Set Up of Games

It is said that video games are set up in a strategic way to enhance the Brain's dopamine release.

-Fortnite-

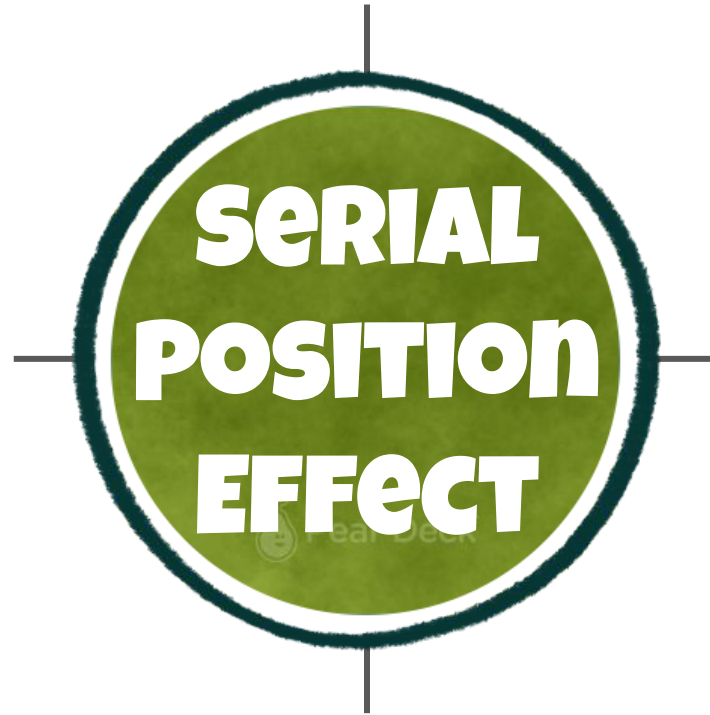
Consistent stream of triggers that enhances the release of dopamine.

Keeps players engaged and motivated by the consistent challenges, rewards, and completion of task notifications to keep the game exciting and unpredictable.



The psychology behind the video game setup

THE FOUR KEY POINTS WE DISCUSSED RELATING TO THE SERIAL POSITION EFFECT WERE?



Students, draw anywhere on this slide!



“

“In particular, gaming has been shown to foster communication skills, teamwork, problem-solving abilities, and creativity, as well as belonging and connection.”



– Dr. Andrew K.
Pryzbylski

3 C's of Video Gaming



Competence

Development of confidence and achievement through actions within the video game.



Connection

By playing together players build relationships, form friendships, and develop a sense of community.



Control

Video Games enhance creativity and ability to develop personal agency.

Video Gaming Recap

The impact of video games on the brain is complex and multifaceted.

It is important to note we approach these claims with nuanced perspectives, not all players will experience the same emotional, psychological, and social responses.

However it is crucial to not that the purpose was to be enjoyable and entertaining.

If there are negative effects transpiring perhaps we can engage in other activities that promote relaxation and reduce the stress response in the brain.

Strategies that promote Digital Wellness.

Breaks

Improve your performance by incorporating frequent breaks.

Movement

The human body craves movement to realign and avoid potential for serious injury to occur.

Technoference

Aim to avoid technoference (lose touch with physical surroundings). Connect socially with someone in the physical to check-in and ensure emotional responses are aligned with our best self.

DRAG YOUR DOT TO THE “3’CS” WE DISCUSSED GAMING CAN ENHANCE?



Communicate,
collaborate, connection



Competence,
connection, control



Creativity, community,
coordinate



Students, drag the icon!



04

Social Media + Chronic Tech Use

Explaining the different stages of social media use and the effects it can have on our brains and body.





Social Media Usage.

When we use social media we often begin viewing the world from an internal perspective rather than the external perspective we normally have.



Natural Responses.

Our responses, emotions, thoughts, and physical sensations are reflected at us in a reversed manner.

This can lead to potential challenges with self concepts, image, anxiety, and several other mental health complexities.



Social Media Connections

Excessive social media use and exposure can potentially impair neurological pruning in several ways:

Reduce Cognitive Function

- Decreased time spent on other activities (reading, problem solving, IRL interactions). Every choice has a trade-off.

Increased Distraction

- Highly engaging and captivating for dopamine release. This can be very stimulating and has potential to disrupt brain natural pruning stages.

Physical/Mental Effects

- Excessive screen time can alter the brain natural process of its release of melatonin.
- Comparison, competition, and criticizing.

Micro-cultural Interactions

- Reduced face-face interactions.
- Further effect the brains ability to develop and refine social skills through pruning.





Illusive Designs



Stimulation
Appeals to our
sensory system



Algorithms
Targeted advertisements



Infinite Information
Endless scrolling



Engaging Influence
App features



Hypothalamus

Hey PG! Stressor;
another negative post.

Pituitary Gland

On it! Adrenals,
release the cortisol

Adrenal Glands

Roger, cortisol go help
the bloodstream

Cortisol

Cortisol to save us
all!

Stress in the Body

1. **Hypothalamus** sends a chemical message to the pituitary gland.
2. The **pituitary gland** sends a chemical message **AC (adrenocorticotrophic hormone)** through the brain to the adrenal glands.
3. The **AC** tells the **adrenal glands** to produce **cortisol**
4. **Cortisol** flows through the blood stream and tells the body what to do next.

Cortisol Levels



Cortisol increases blood sugar levels, suppresses the immune systems, increases heart rate, which could lead to chronic addiction.

When cortisol levels are increased for a prolonged time it can be linked to potential health complexities such as:

1. Suppressed immune function
2. Digestive problems
3. Weight gain
4. Mental Health obstacles
5. Cardiovascular disease



Cortisol - The Stress Hormone

**WHAT IS THE one OF
THE THING(S)
excessive CORTISOL
ReLease IN THE BODY
CAN POTENTIALLY
LeAD TO?**



Pear Deck



Students, write your response!

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**HAVE YOU
EXPERIENCED THE
DEMAND AND
PRESSURE OF
ENGAGING IN SOCIAL
MEDIA? HOW DOES
THIS IMPACT YOUR
WELLNESS?**



Pear Deck

Students, write your response!

Pear Deck Interactive Slide
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Brain Activity Connected to Social Media



Reward System (Mesolimbic Pathway)

Notifications, received messages, and promotion of engaging media can create a feedback loop of engagement.



Craving

This can lead to compulsive or addictive behavior and the need for more social media use.



Marketing

Social media companies have intentionally designed their platforms to promote reward processing and increase engagement.

Potential cues to build Awareness

Spending more
time then
intended.

Neglecting other
I.R.L. activities
or
responsibilities.

Withdrawal
symptoms while not
using platforms.
(depression,
anxiety,
irritability, etc).

Addiction is a complex and multifaceted condition.

This should be considered before we adopt this vocabulary



05 Where do we go from here? **Action Plan**

How do we use this newly acquired knowledge to flourish in the digital world?

Story Time:

The Park



Steps to promote Digital Wellness.



Model

Model appropriate for others to see in a leadership capacity.

Manage

Manage when, where, how we are using our technology.

Monitor

Monitor our responses, mood, emotions before and after technology usage.

Purposeful

What was the intent when I initially opened the platform? (Task, social, entertainment?)

Parameters

Set boundaries, moderate usage, be selective of disengagement from the physical environment.

Preparedness

Navigate with peer mentorship. Avoid blame, ask for guidance, and engage in conversations with peers.

**WHAT IS one STEP
YOU'RE GOING TO TAKE
TO IMPROVE one
FACETS OF YOUR
DIGITAL WELLness?**



Pear Deck



Students, write your response!

Pear Deck Interactive Slide
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06 Questions, Comments or Inquiries?

This is an evolving space we're in together, learning and navigating landscape that is continuously changing and offering several new experiences. Let's take time to disconnect to reconnect.

THANK YOU!



Do you have any
questions,
comments, or
inquiries?



✉ Cason.machacek@lethsd.ab.ca

📞 (403) 892-07**

💻 <https://digitalwellnessteam.schoolsites.ca/>

Alberta Education Curricular Links

● ● ● Physical Education & Wellness Curriculum

L.O. #6- Students examine risk and identify factors that influence actions.

Health and Life Skills Program of Studies

Wellness- 2- Positive Health Habits

Relationships- 3- Stress and Stress Management

Career and Life Management

Personal Choices- 2- Evaluate choices and combinations of choices that can create barriers to achieving and maintaining health, and identify actions to improve health.

Personal Choices- 7- Analyze a variety of strategies to achieve and enhance emotional and spiritual well-being.

Personal Choice- 13- Investigate how science, technology, and media affect wellness.

CREDITS.

Presentation Template: [SlidesMania](#)

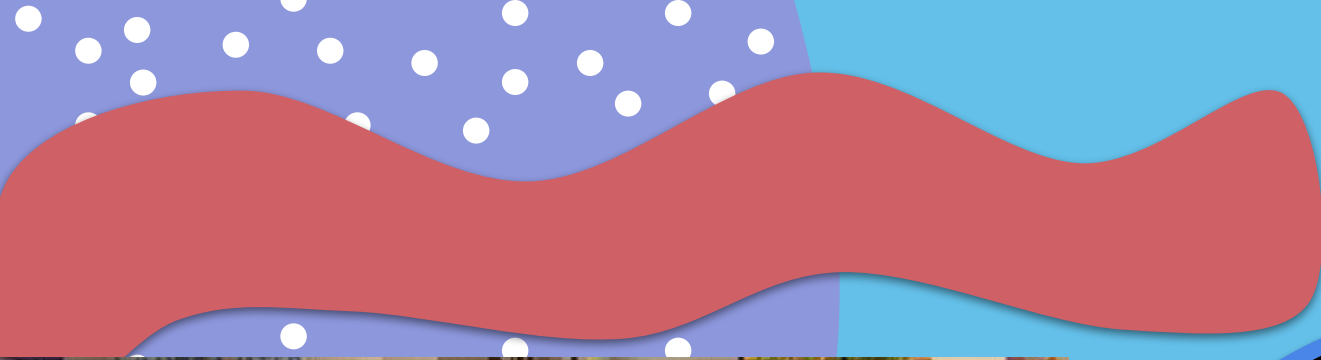
Sample Images: [Unsplash](#)

Fonts used in this presentation: Roboto Mono and **Roboto Bold**

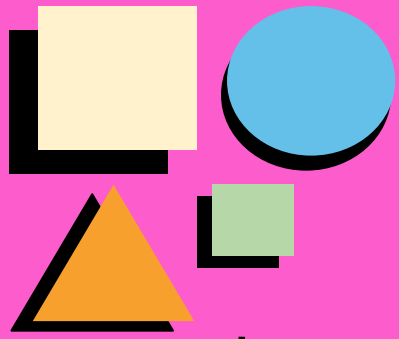
Channel 4 News. "Fortnite: What happens to your brain when you play"| YouTube. 04 Apr 2019, <https://www.youtube.com/watch?v=06QhTffGF0k&t=80s>

Neuroscientifically Challenged. "2- Minute: Neuroscience Norepinephrine"| YouTube. 04 Apr 2021, <https://www.youtube.com/watch?v=m8kthAppQys>

Kennyley, M., Kirk, R. E., & Westbrook, J. D. (1983). The KKW model: A model for describing the dynamics of human response to environmental stimuli. *Journal of Environmental Systems*, 13(2), 95-112.



Grudge Ball Review Game



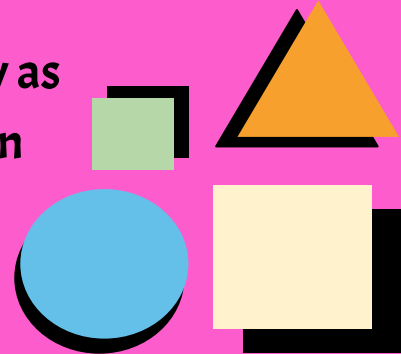
Breakdown

Each team starts out with 10 (X's) or Points.

Objective: Be the last team with points, knock other teams out of the game by taking away their points. Use appropriate Method for Questions

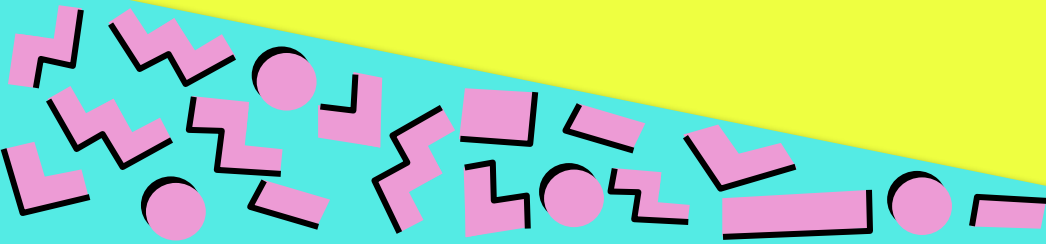
Distribution (Spinning wheel, multiples per team, take turns, self paced, etc.)

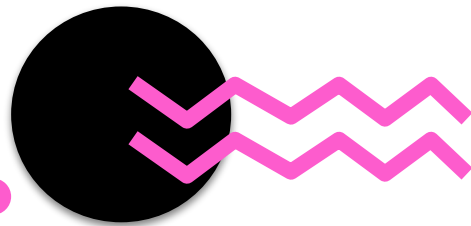
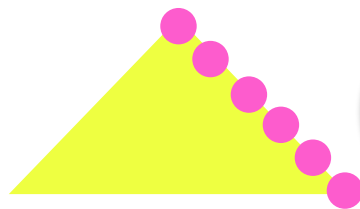
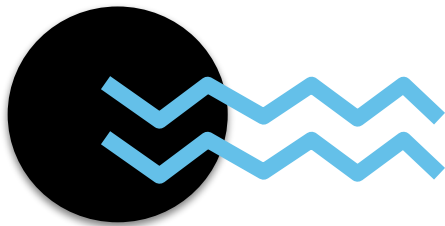
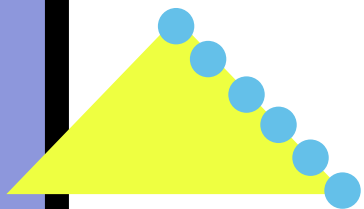
Goal: Earn the ability to knock off points by answering questions correctly as a team. Each team will receive their own set of questions to answer to earn ability to eliminate other team's "X's."



Breakdown Continued...

- ❑ Answering Correctly= Knock “1” X (points) of any team
- ❑ If you answer correctly you get a chance to take a “2” or “3” point attempt. (To add potentially 1 or 2 more X’s (points) you can eliminate from a team.
 - ❑ 2 Pointer= Knock “2 Total” X’s (points) off the board.
 - ❑ 3 Pointer= Knock “3 Total” X’s (points) off the board.
 - ❑ When distributing your X’s (points taken from teams), you can choose to split the distribution of your X’s among multiple teams if you have more than 1 to take away from opposing teams..
- ❑ If you miss you can still take off your “1” X earned from a teams total.

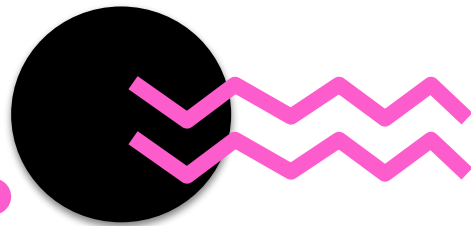
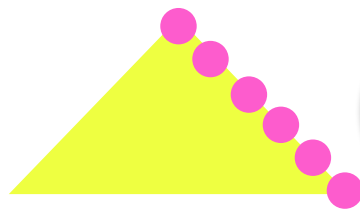
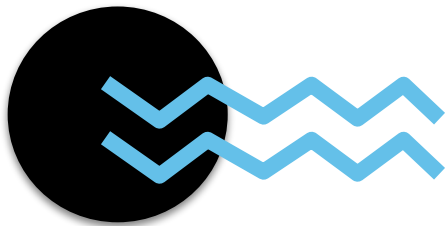
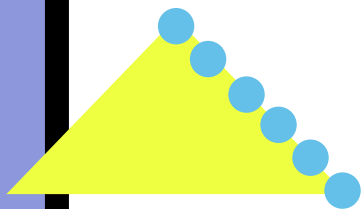




As the Game Progresses

When a team loses all of their X's, they're out! To get back in the team will have to answer questions correctly without attacking other teams until they have regained at least 3 X's → These teams will receive a shot from the (2 or 3) point line each correct answer!

Last team standing with the most X's is the winner!



Gameplay Layout/Materials

Materials



- Whiteboard, marker, and eraser- per team.
- Door-hanging basketball hoop or trash can may also be used with crumpled up paper.
- 2 & 3 point line indicator (tape can be used)
- Whiteboard/ Game Board images for scoreboard
- Created gameplay questions (template on following slides)





Game Management

Any disrespectful or obnoxious behavior loses your team an X at the teacher's discretion. If anyone on your team has their phone or materials out your team also loses an X.

Repeat offenders will be taken out of the game and asked to complete a secondary activity.



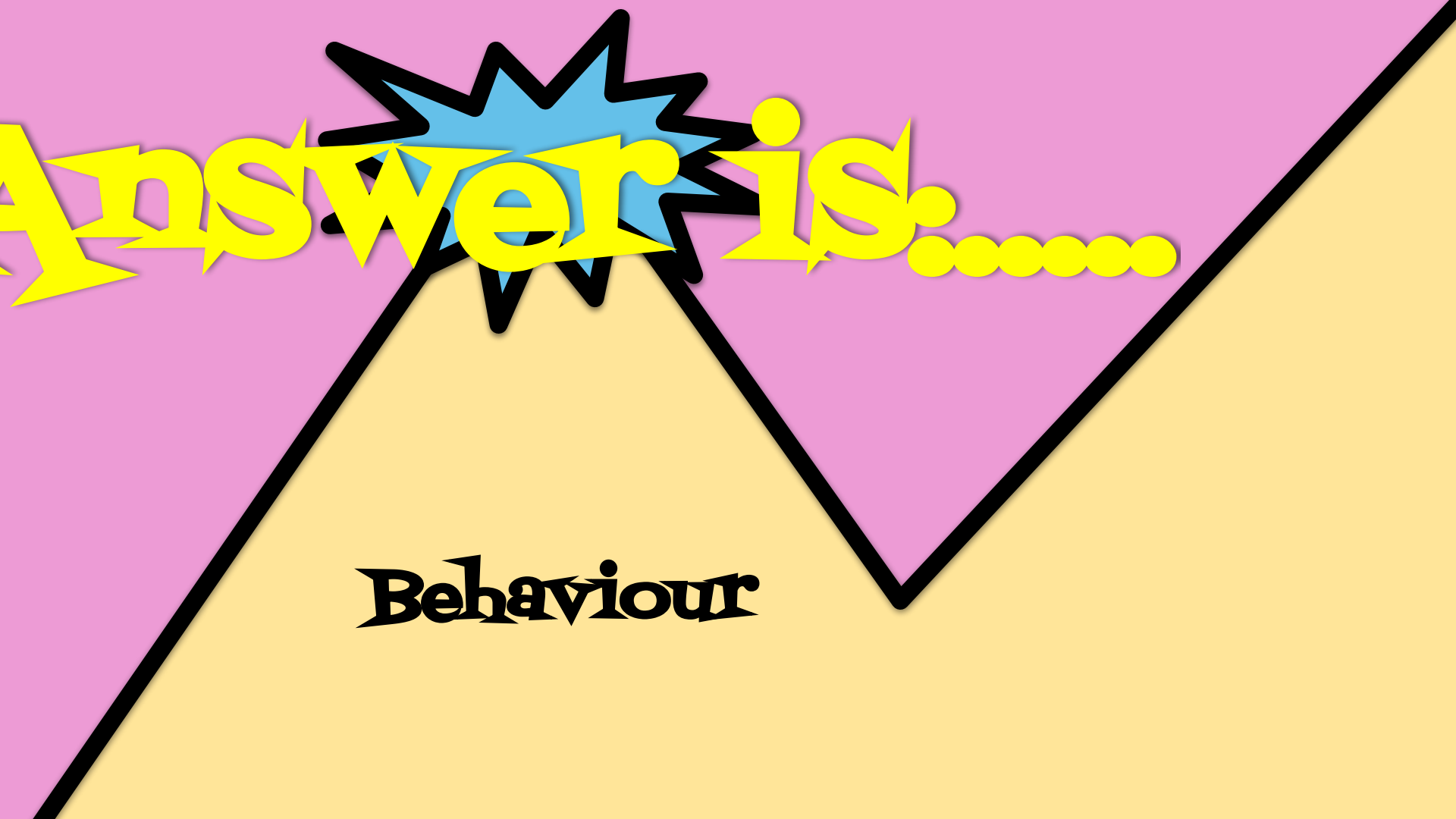
Let's Go!



Question#1

The stage within the KKW Model that involves an action or response is called?

Answer



Answer is:.....

Behaviour



Question #2

**The effect in which
our brains
remember beginning
and end of events is
called?**



Answer



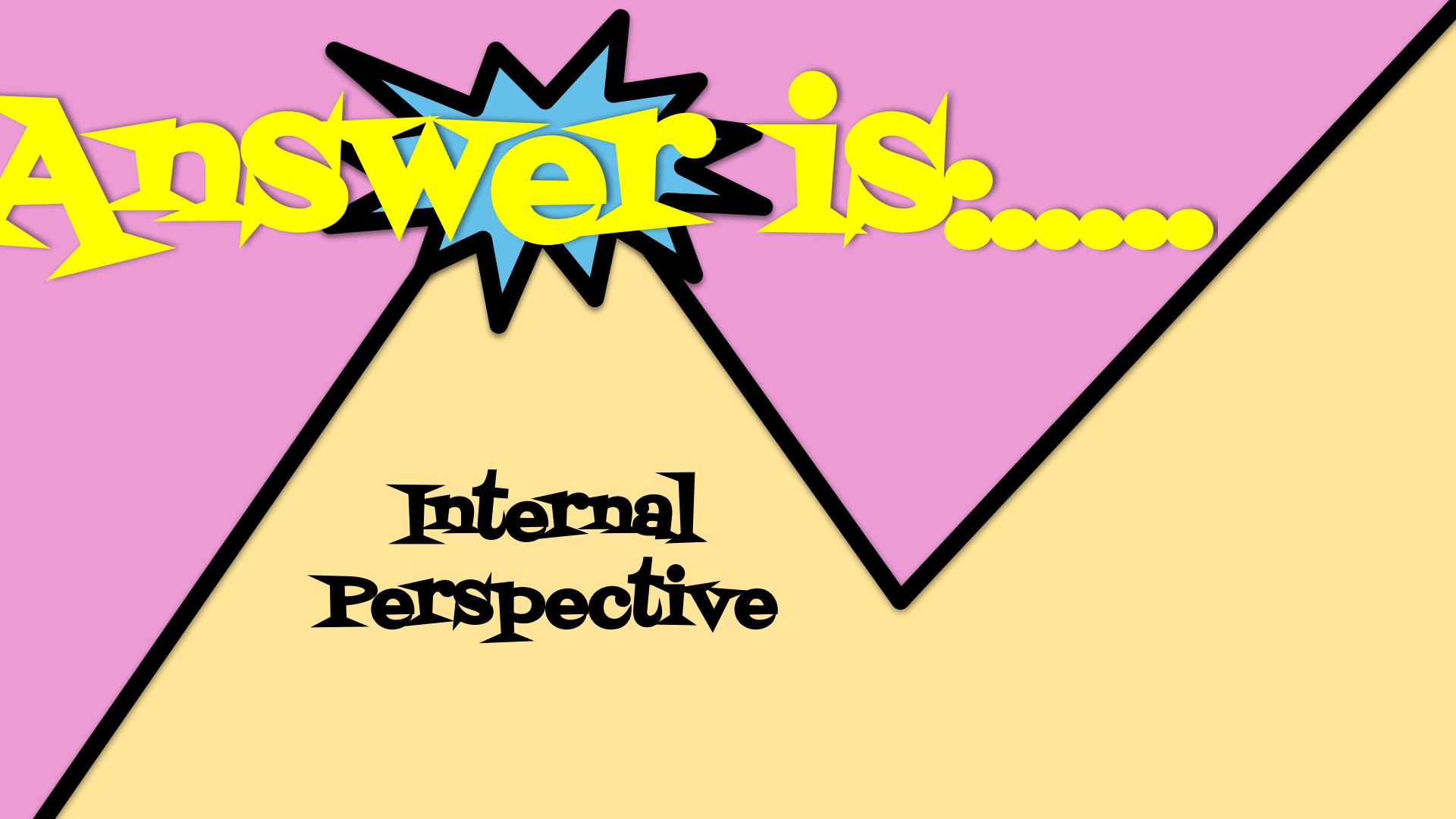
Answer is.....

**Serial
Position
Effect**

Question#3

Social media often offers viewers a _____ perspective, opposite of the perspective we normally receive.

Answer



Answer is:.....

**Internal
Perspective**



Question #4

Prolonged gaming and
technology use
_____ the build up
of Norepinephrine



Answer



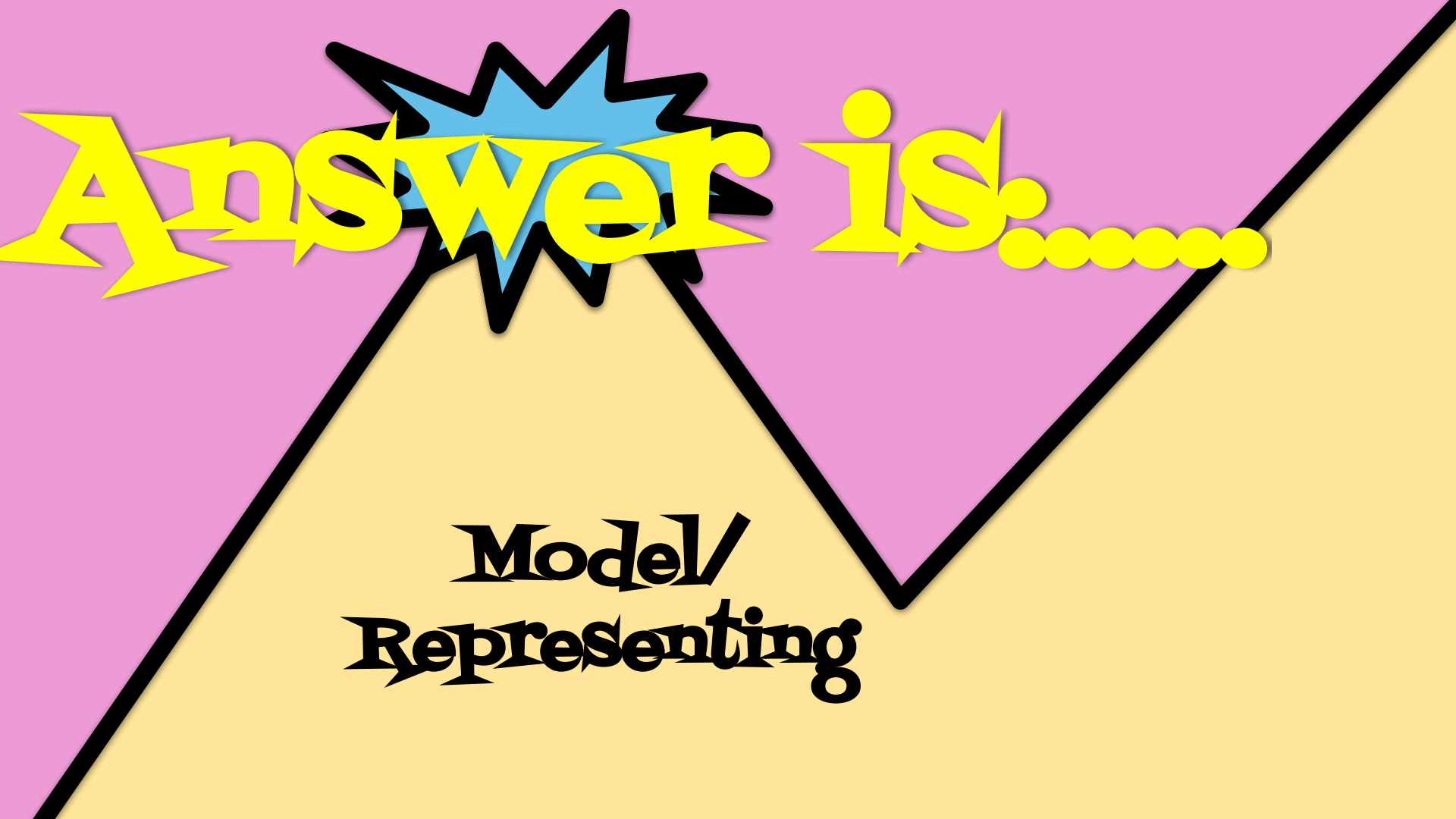
Answer is:.....

Increases

Question#5

What others see,
view interpret or
take can be
referred to as _____

Answer



Answer is.....

**Model/
Representing**



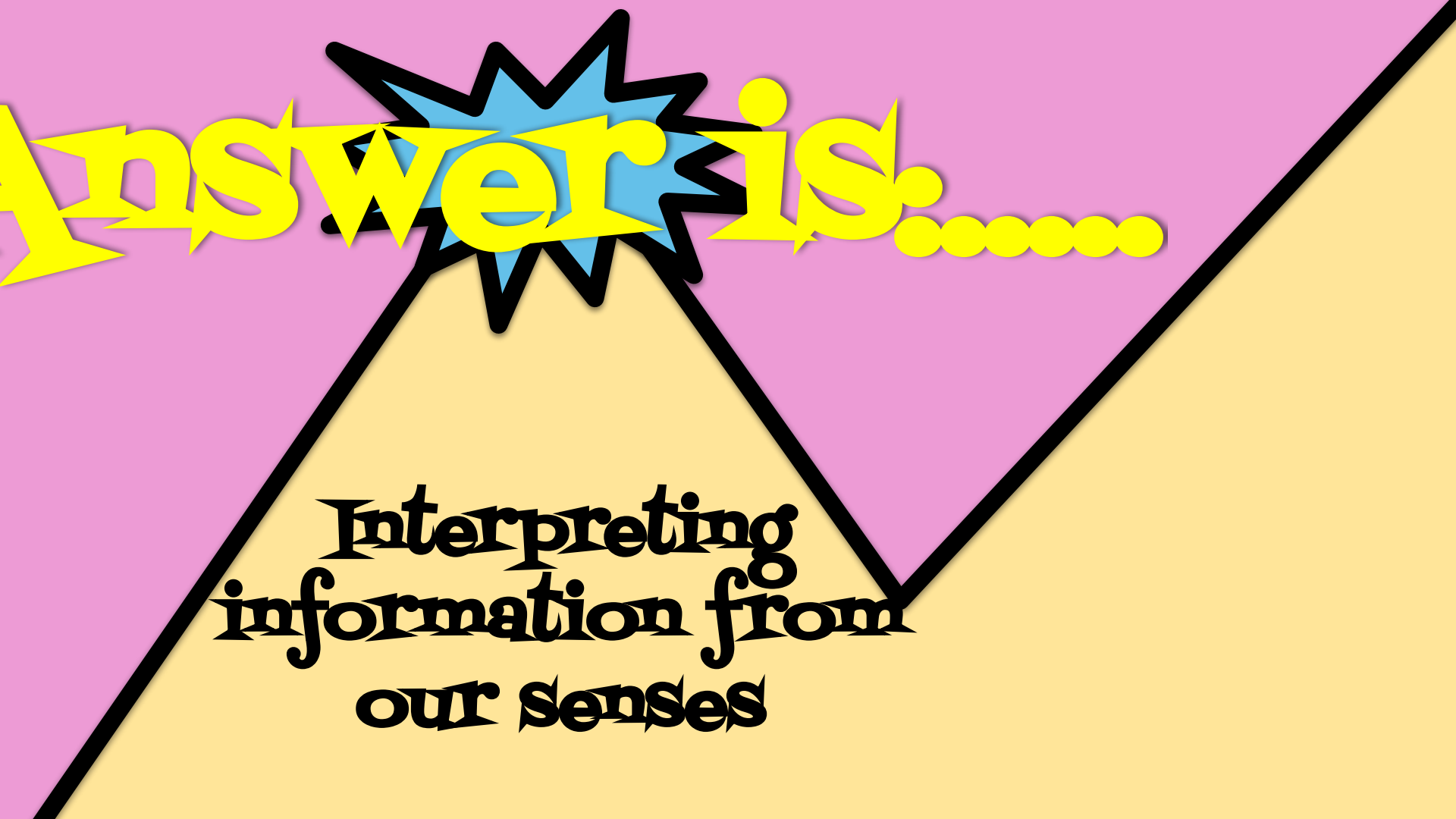
Question #6

Define:

Perception?



Answer



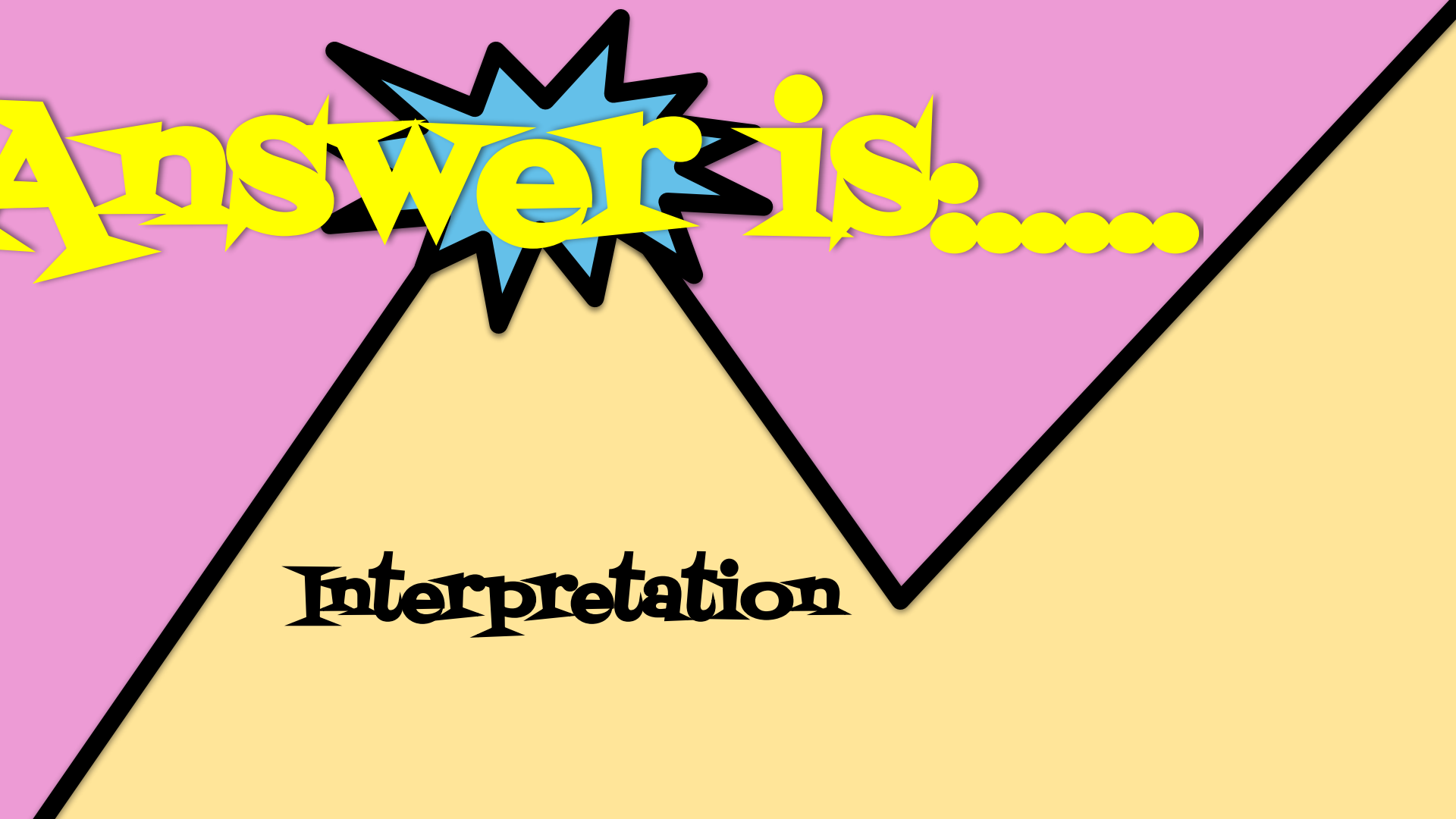
Answer is:.....

**Interpreting
information from
our senses**

Question#7

The stage within the KKW Model that aligns with our thoughts is called?

Answer



Answer is.....

Interpretation

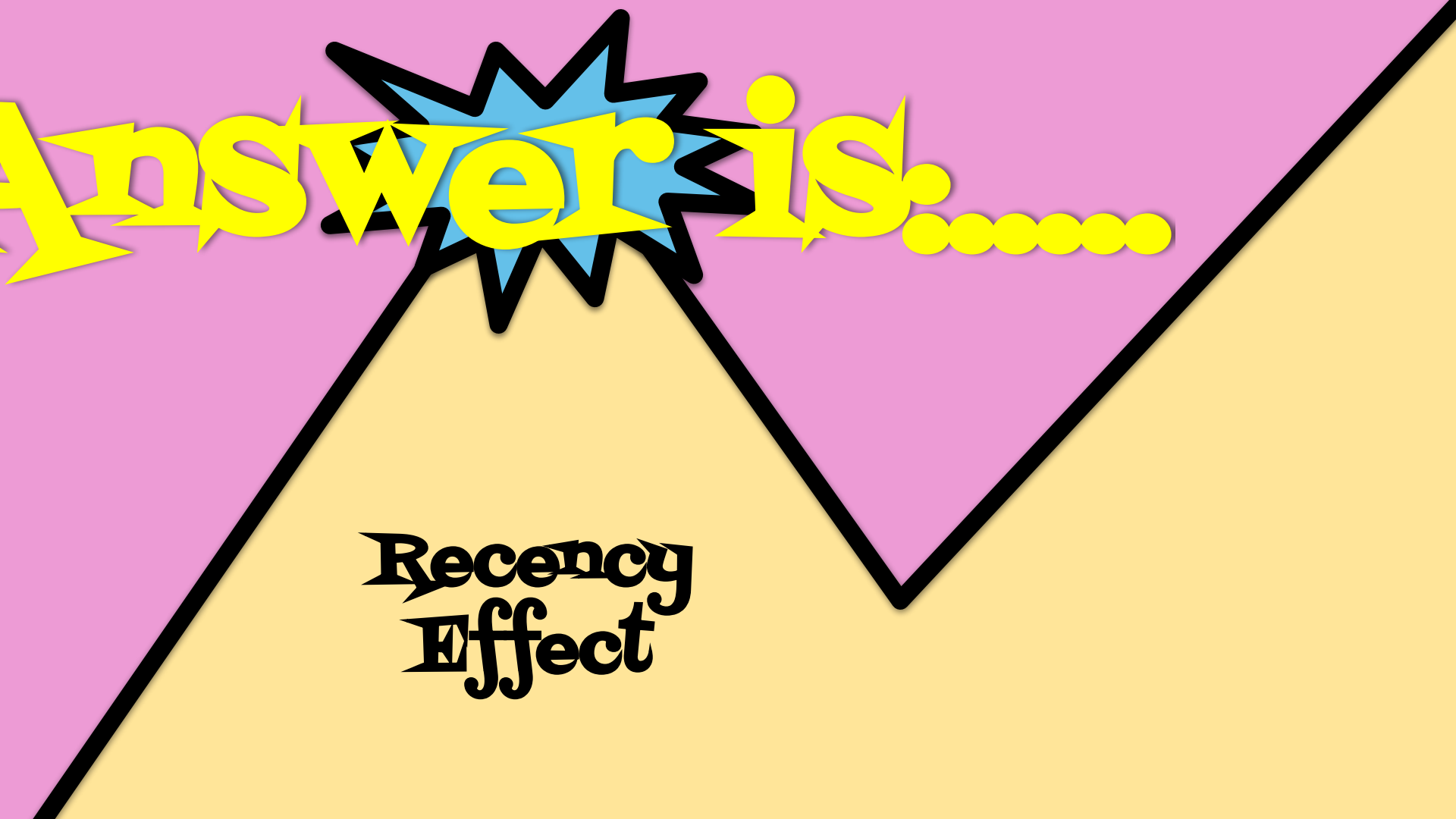


Question #8

Recalling the last item, topic talked about, or part of a game is called?



Answer



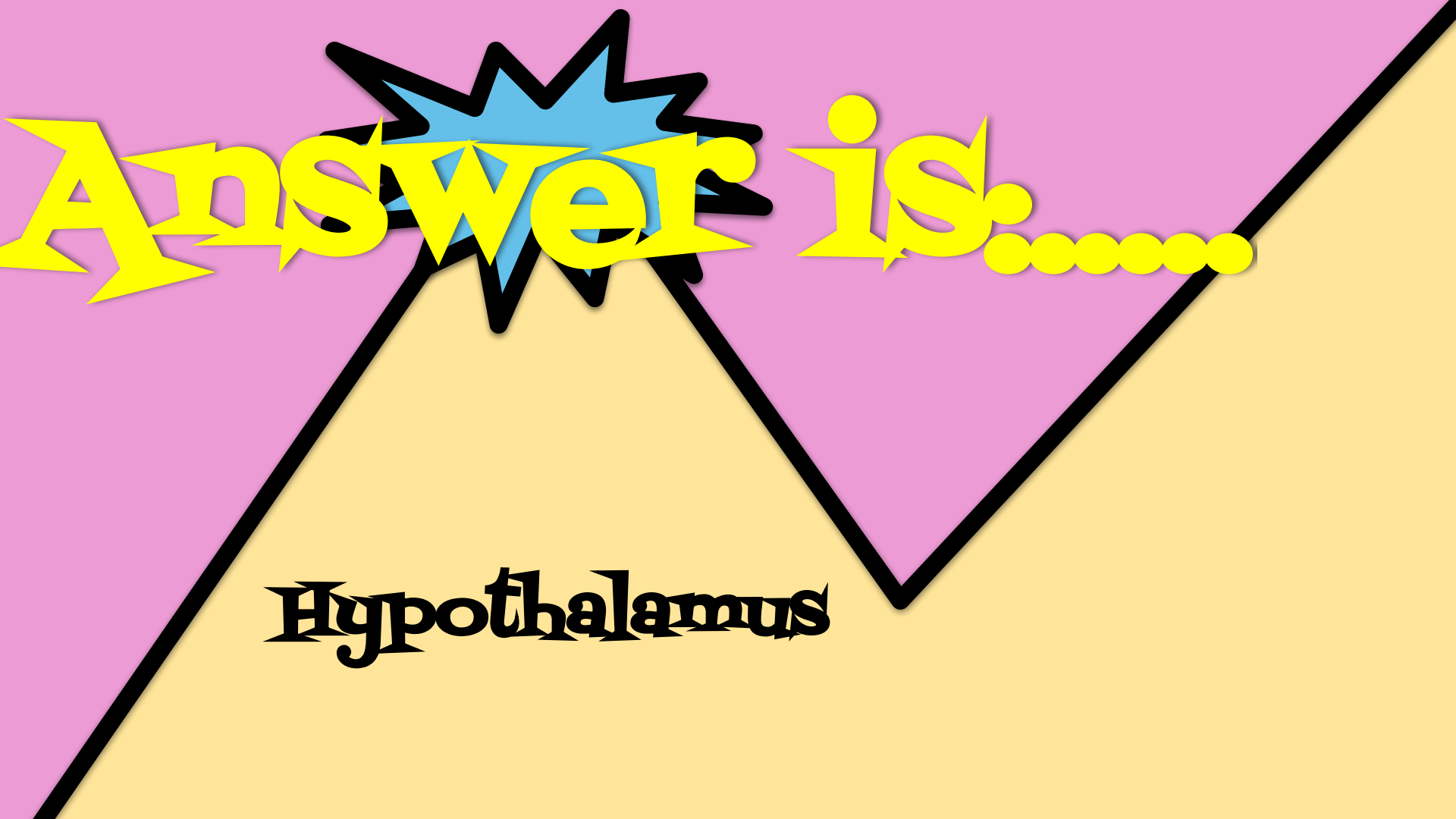
Answer is:.....

**Recency
Effect**

Question#9

**The part of the
brain that sends a
chemical message to
the P.G.**

Answer



Answer is.....

Hypothalamus




Question #10

**Norepinephrine aids
in the ability to
maintain?**



Answer



Answer is.....

Focus and Alertness

Question#11

Setting boundaries,
limits, and
appropriate places to
use tech is called

Answer



Answer is.....

**Establishing
Parameters**

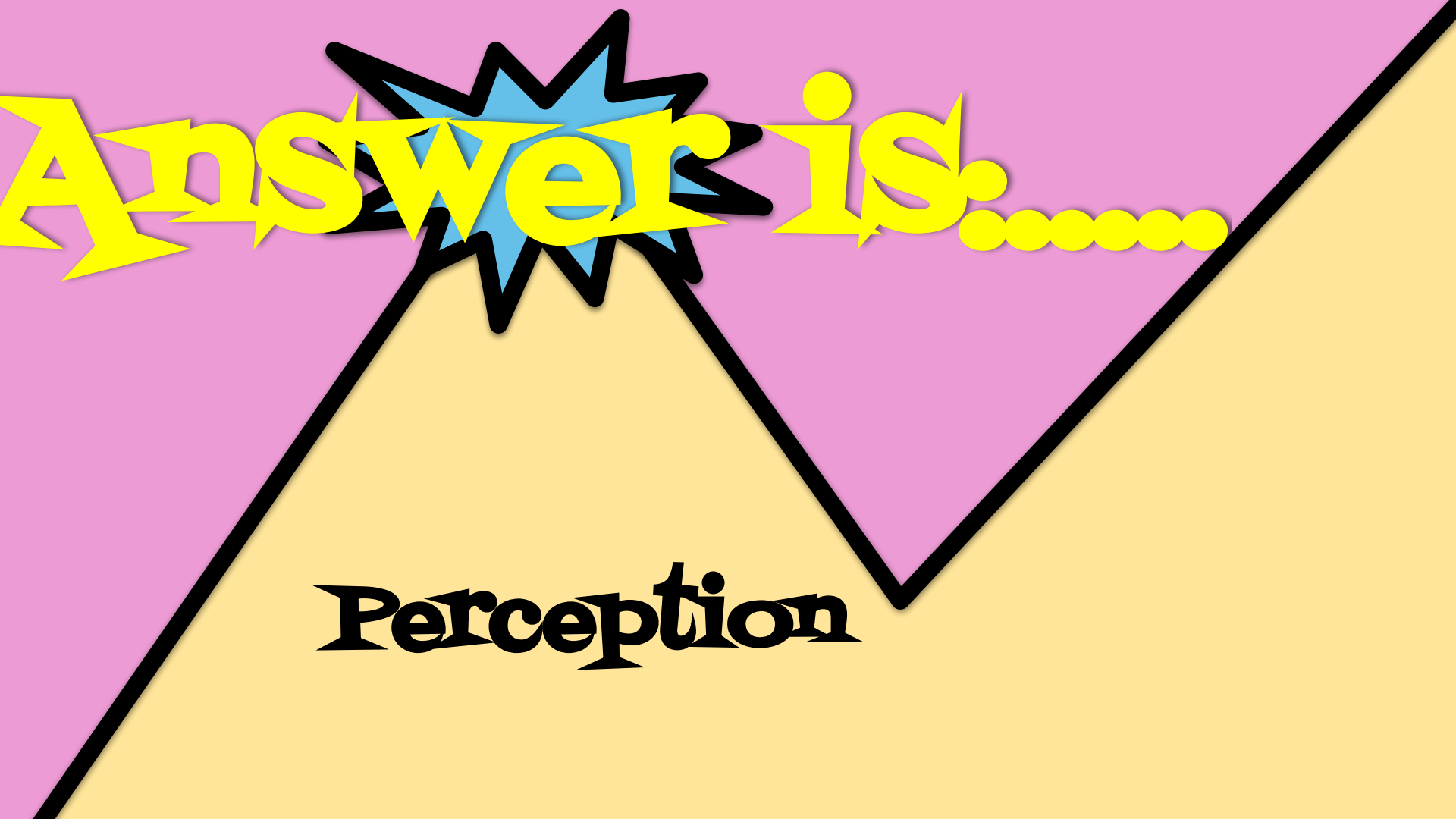


Question #12

The stage within the KKW Model that associated physical feelings is called?



Answer



Answer is:.....

Perception

Question#13

Video games are set up in a strategic way to enhance the brain's release of?

Answer



Answer is:.....

Dopamine



Question #14

 flows
through the blood
stream and tells the
body what to do
next?



Answer



Answer is.....

Cortisol

Question#15

**Epinephrine
is triggered
in a body
response to?**

Answer



Answer is.....

**Stress
(Fight, Flight,
Freeze, Fawn)**

Question#16

The act of intentionally completing or using technology could be know as?

Answer



Answer is.....

**Purposeful
Use**

Question#17

The stage within the KKW Model that analyzes the outcome of a action/behaviour is called?

Answer



Answer is.....

Feedback

Question#18

**What were the three
C's that video games
can help enhance and
develop?**

Answer



Answer is.....

Competence
Control/Creativity
Connection

Question#19

Notifications, received messages, and promotion speak to the brains ____ system?

Answer



Answer is.....

**Mesolimbic Pathway-
Prefrontal Cortex- Reward System**

Question#20

When navigating new
platforms or exploring
new content we should
always seek to do so
alongside a
_____?

Answer



Answer is.....

**Trusted
Peers**

THANK YOU FOR YOUR SUPPORT!

I wanted to take a moment to express my heartfelt gratitude for your support and initiative in educating students about digital wellness, healthy balance, and responsible technology usage. Your dedication and commitment to your students' well-being is inspiring. The knowledge and skills you're imparting in your students will have significant impact on their lives, both now and in the future.

We would love to invite you to visit our website for more similar activities or reach out to me directly for any further assistance or information, if you found this resource helpful, purposeful, and engaging.



Cason Machacek

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 Digital Wellness Teacher

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