FITT-VP: Exercise Prescription Framework
F= Frequency, I= Intensity, T= Time, T= Type, V= Volume, and P= progression

CARDIORESPIRATORY FITNESS: Aerobic fitness
3-5 days a week, depending on intensity
Go beyond baseline to lose weight (150 mins+)
Volume → measured by MET (500-1000)

MUSCULAR FITNESS: Muscular strength (1RM) and Muscular Endurance (hold contraction)
2-3 days a week (48 HOURS between using each muscle group)
Intensity: 8-12 reps @ 60%-80%
10-15 reps @ 40-50%
Sets/Volume: Each muscle → 2-4 sets, 2-3 mins between each set
ALWAYS train opposing muscle group as well!
Progression: Many ways → add weight, add sets, add reps, add more training days

FLEXIBILITY: Improve joint range of movement → 10 mins/4 reps each stretch
Hold stretches for 10-30 secs where it is tight

NEUROMOTOR EXERCISE: Great for elderly/ people who are fall risks
Includes balance, coordination, agility, and proprioceptive training
2-3 days a week
Intensity: Changes in 3 ways → Base of support, center of mass, peripheral cues
Tia chi, Yoga, Pilates (walking balance, seated balance, standing balance)

ADVANCED TRAINING: Plyometrics → improve power, agility, speed (jumping training)
Resistance Training → weight training/strength training
Came about during WWII
Should be guided by evidence, not testimony
SAID → Specific Adaptations to Imposed Demands (more reps, more endurance the muscle builds)

PROGRAM DESIGN: Always needs to be changed overtime for progress
Do initial assessments (goals, time frame, health issues, target areas)
Asses → body composition, anthropometric measurements, endurance
Follow up assessment: Keep logs, always customize to the clients physiological needs, ask for feedback → always listen to your client and read their body language

AFFECTS OF OVERTRAINING: Delayed Onset Muscle Soreness (DOMS)
DOMS is not a goal. Soreness should be 3 on scale from 0-10
HYDRATE
*diuretics can influence tissue damage
Rhabdomyolysis → Rapid breakdown of tissue in high amounts
This can be harmful to kidneys and can cause kidney failure (even death)
Symptoms: dark red-brown urine, severe muscle aches, weakness

**TRAINING GOALS:** Capping → small gains need large amounts of time, yet they are very necessary and shouldn’t discourage a client
Most training goals are unrealistic

**VARIABLE RESISTANCE DEVICES:** Need lever arm, pulley, or cam machine
Purpose is to alter resistance throughout ROM

**ELASTIC BAND:** For resistance training → matches ascending curve- bell ROM
 Doesn’t offer feedback to clients/ needs the correct stretch and angle for it to work

**DYMANIC CONSTANT EXTERNAL RESISTANCE DEVICES:** Good for real world setting
This type does not stimulate neuromuscular systems involved maximally through the entire ROM
It provides little to NO limitation in ROM
*Isotonic:* Muscular contraction in which muscle exerts a constant tension
*dumbbells*, barbells, kettle bells, weight machine

**STATIC RESISTANCE DEVICES:** These are static/isometric → a muscular action where no change in the length of the muscle takes place
Normally performed against an immovable object
*Good for joint disorders
**Can also be performed by having a weak muscle group contract against a strong muscle group

**OTHER RESISTANCE DEVICES:** There are three
*Isokinetic:* Popular in rehab settings → velocity is controlled and can’t be accelerated. You can maintain max resistance through the entire ROM
Uses friction, compressed air, and pneumatics
**Pneumatic resistance:** Compressed air exercises that can be adjusted during a rep
Unable to address balance and control / but allows both concentric and eccentric movements
**Hydraulics:** Safe and non-intimidating / *concentric only training
You do need to train the eccentric phase to protect muscle

**MACHINE V. FREE WEIGHTS:**
1) Machines are constricting
2) Free weights are FULL ROM
3) Machines are good for rehab in pinpointing a muscle → free weights are good for triggering stabilizers and assistance muscles
4) Don’t generally need a spotter for machines
5) Machines are less intimidating at first
6) Both offer movements that have no joint deceleration
7) Rotational machines accommodate certain body movement that free weights cant
CHOOSING MUSCLE GROUPS: Biomechanical principles need to specify exercises by:
- joint around the muscle, joint ROM
- pattern of resistance through ROM (ascending, descending, bell)
- pattern of limb velocity throughout the ROM
- type of muscle contraction (eccentric, concentric)

**Transfer Specificity** that what you are training can carry over to what you’ve been training to do

CHOICE OF EXERCISE: Primary v. assistance Prime movers: leg press, bench press
Assisted trains muscles that aid in the movement of prime movers (bicep curl)
Multi-joint v. Single joint Multi joint is squats, military press, pull downs
Single joint is knee curl, bicep curl

*whole* body multi-joint is deadlift, power cleans, etc.
Bilateral v. Unilateral Unilateral helps balance

ORDER OF EXERCISE: Larger muscle group before smaller ones
Multi-joint before single joint / explosive before basic
Weak areas before strong / intense to least intense

*reps: 6-12

***TIP:*** Number of sets is a critical variable in volume equation vital in progression

**CRF ASSESSMENT:** Tests how well you can do certain moves Used for: Exercise programming, Progress charting, and prediction of medical conditions
*The test is contraindicated for unconditioned beginners, and those with preexisting heart problems

**ONE REP MAX:** To express muscular strength as a ratio to total body weight
Usually test bench press or leg press

**Formula:** max weight lifted (lbs)/ weight of client (lbs)

**MUSCULAR ENDURANCE ASSESSMENT:** applying a force repeatedly over time
Usually test push ups and curl up

Push ups women on knees, men standard (till fail)
Crunches up to 75 (or until cadence is broken)

Tape for crunches: 8cm apart for 45 and up, 12 cm apart for 45 and younger

**BMI (Body Mass Index):** (body weight in kg/height in meters^2)
1kg = 2.2 lbs 1 inch = 2.54 cm, 100 cm = 1 meter

Example: I weigh 130lbs and am 5'5". Convert 130 into kg = 130/2.2 = 59.09
Convert 5'5", which is 65 inches = 65x2.54 = 165.1cm 1.65m
SO 59.09 / 1.65^2 = 21.72
*NOT the best measurement for fat since it does not differentiate between fat and fat free weight

**Anthropometry**
**WHR (Waist-to-Hip Ratio):** BEST measurement for body weight distribution
If MORE weight is near the **trunk**, higher risks for many things!
- **Men** → no more than .95 (waist should be 31.5-40 inches)
- **Woman** → no more than .86 (waist should be 27.5-35 inches)

**Anthropometry**

**SKINFOLD (Jackson-Pollock):** It’s an estimate, not always accurate, BUT can show client’s progress
- Sum of 3 skinfolds: **Men** → chest, abdomen, thigh
- **Woman** → triceps, suprailiac, thigh
  (Then check chart for measurements %)

**Body Composition**

**BIA (Bioelectrical Impedance):** noninvasive and easy to administer
- Uses electricity to check volume (muscle has lots of water, fat doesn’t)
  **ONLY VALID** if: No eating 4 hrs prior
  - No exercise 12hrs prior
  - Pee 30 mins before
  - No alcohol for 48hrs

**Body Composition**

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**PLANES OF THE BODY:** Sagittal → Left and Right
- Frontal → Anterior and Posterior
- Transverse → Superior and Inferior

**REFERENCE TO THE BODY:**
- Ipsilateral v. Contralateral → Same side v. Opposite side

- Unilateral v. Bilateral → One side v. Both sides
  - Valgus v. Varus → Distal segment of a joint that deviates laterally v.
    - Distal segment of a joint that deviates medially

  ***TIP:*** Valgus has an ‘l’ for ‘lateral/ Varus sounds like ‘air’, the knees have gap < -- >

**PLANES (AND MOVEMENT):**
- **Sagittal Plane** → **Flexion v. Extention**
  - Movement on FRONTAL axis (ex. Walking, Squatting, Overhead Press)

  - **Flexion:** movement decreasing joint angle anteriorly to sagittal plane
  - **Extension:** movement increasing joint angle posteriorly to sagittal plane

  #2

- **Dorsiflexion v. Plantarflexion**
  - Dorsiflexion: Flexing the ankle so the foot moves anteriorly
  - Plantarflexion: Extending the ankle so the foot moves posteriorly
Frontal Plane → **Abduction v. Adduction**
Movement on SAGITTAL axis (ex. Star Jump, Lateral arm raises, side bending)
*Abduction:* Movement away from midline on frontal plane
*Adduction:* Movement toward the midline on frontal plane

#2
* **Lateral Flexion:** R or L movement away from midline (usually for trunk or neck)
  *head tilt, body tilt*

#3
**Elevation v. Depression** (shoulder shrugs)
*Elevation:* Movement of the scapula superiorly on frontal plane
*Depression:* Movement of the scapula inferiorly on frontal plane

#4
**Retraction v. Protraction** (shoulders front and back)
*Retraction:* Movement of the scapula toward the spine
*Protraction:* Movement of the scapula away from the spine

#5
**Upward Rotation v. Downward Rotation**
*Upward R:* Superior and Lateral movement of the inferior angle of the scapula
*Downward R:* Inferior and Medial movement of the inferior angle of the scapula

#6
**Eversion v. Inversion** (sickle foot, turned out foot)
*Eversion:* Abducting the ankle → turn out
*Inversion:* Adducting the ankle → sickle

#7
**Radial deviation v. Ulnar deviation**
*Radial D:* Abduction of the wrist on frontal plane → wrist comes in
*Ulnar D:* Adduction of the wrist on frontal plane → wrist goes out

#8
**Pronation v. Supination** (Foot or Ankle)
*Pronation:* Combined movements of abduction and eversion resulting in the lowering of the medial margin of the foot → Ankle leans IN
*Supination:* Combined movement of adduction and inversion resulting in the raising of the medial margin of the foot → Ankle leans OUT (me...)

#9
**Circumduction:** A compound circular movement involving flexion, extension, abduction, adduction, circumscribing a cone shape

Transverse Plane → **Horizontal Abduction v. Horizontal Adduction**
*H. Abduction:* Movement away from midline on transverse plane
*H. Adduction:* Movement toward the midline on transverse plane

#2
**Internal (Medial) Rotation v. External (Lateral) Rotation**
*Internal R:* Rotation on the transverse plane toward the midline of the body
*External R:* Rotation on the transverse plane away from the midline of the body
Rotation: R or L rotation on transverse plane (usually neck or trunk)

Other → Opposition: Diagonal movement of thumb across the palmer surface of the hand to make contact with 5th digit (making the OK sign)

BONES

Long Bones → Legs: Femur and Tibia
Arms: Humerus
Forearm: Ulna and Radius
Short Bones → Carpals and Tarsals (hands and feet)

***TIP: Tarsals are feet because ‘T’ is for ‘toes’

ARTICULAR SYSTEM

Joints: Articulations between bones
Ligaments: Tough, fibrous connective tissue anchoring bone to bone

Most common joints: Synovial Joints
No other joint contains synovial fluid

Proprioceptive Feedback: These joints have a sensation because of sensory fibers
*Feedback is IMPORTANT for preventing injury and regulating human movement

Cartilaginous Joints: Primary and Secondary
Primary: Usually temporary to permit bone growth/ fuse (epiphyseal plates)
Secondary: Strong, slightly mobile joints (intervertebral disk/ pubic symphysis

Synovial Joints: 6 types
Plane: gliding and sliding
Hinge: uniaxial movements (elbow extension and flexion)
Ellipsoidal: Biaxial joint (flexion at wrist)
Saddle: Unique joint that permits movements in all planes, including opposition
Ball-and-socket: Multiaxial joints that permit movements in all directions (hip/shoulder)
Pivot Bicondylar: Uniaxial joint that permits rotation- primarily around one axis (knee)

Joints: Open pack v. Closed pack
Open: Least joint congruency (knee slightly bent)
Closed: max congruency and tautness (knee is straight)

ROM: Active and Passive movement
Active: Voluntary Passive: Moved by external means
ROM is quantified by using goniometers and inclinometers
ROM is used for: baseline of prescription and to show progress

Major Joints: KNOW THESE.

SHOULDER INJURIES: More common than hip
Humerus, scapula, clavicle
The glenohumeral moves on ALL three planes/ most freely moving in body
Joint Muscles – move shoulder
Gurdle Muscles- stabilize and maintain posture
  Pec Major  is a prime mover for adduction, horizontal adduction, and internal rotation
Rotator Cuff: Stabilizes shoulder in 4 ways →
  1) Passive muscle tension
  2) Contraction of muscles causing compression of the articular surface
  3) Joint motion that result in secondary tightening of the ligamentous restraints
  4) The barrier effect of contracted muscles

EXAMPLE OF HEART RATE CALCULATIONS:
  RESTING HEART RATE → Usually given. (# of beats in 1 min)
  MAX HEART RATE → 2 ways!
    1) 220- AGE  -or-  2) 208 – (.7 x AGE)
  **HEART RATE RESERVE→ Max HR – Resting HR

FIND LOWER AND UPPER → Uses whatever percentage you want! (80%=.8)
  Upper → (HR Reserve x .8) + Resting HR
  Lower → (HR Reserve x .4) + Resting HR

TARGET HEART RATE → Take upper and lower and divide them by 2
  Target HR → (Upper + Lower)/ 2

EXAMPLE OF ABOVE CALCULATIONS
Age: 26, with Resting HR at 64
  MAX → 220- 26 = 194
  Reserve → 194 – 64 = 130
  Upper → (130 x .8) + 64 = 168
  Lower → (130 x .4) + 64 = 116
  Target HR → 168+116/2 = 142

CONVERSIONS
  LBS to KG  → 1lb = 2.2kg
CALORIES DURING WORKOUT

FIND MET ➔ 1 MET = 3.5 mlkg

EXAMPLES OF MET/CALORIE CALCULATIONS

1) Client runs on treadmill for 45 mins at 7mph
   He weighs 150lbs (so, 68.2 kg), and MET level is 11.7

CALORIES PER MINUTE ➔ (MET x 3.5 x weight (kg))/ 200
   So, (11.7 x 3.5 x 68.2)/200 = 14 kcal
   How many calories for the workout?? = 14 kcal x 45 mins = 630 kcal

VOLUME IN EXERCISE ➔ Using MET and time
1) Client walks 3mph (roughly 3.3MET) for 30 mins a day, 5 days a week
   3.3 MET x 30 mins = 99 MET
   Volume = 99 MET x 5 days a week = 495 MET

IDEAL BODY WEIGHT ➔
   Ex: Mark weighs 220lbs and is 25% body fat. He wants to only have 17% body fat. Find his ideal weight.

   First ➔ take his weight in lbs and x by (% body fat/100)
   So, 220 x (25/100) = 55
   Take that number and minus it from 220 ➔ 220- 55 = 165

   Now you can begin your Ideal Body Weight calculation
   Divide the 165 by [ 1- (ideal % of body fat/100)]
   So, 165 / 1- (17/100) = 165 / .83 = 198.8

   He wants to be 198.8 lbs to hit 17% body fat.
   How much weight does he need to lose?
   Take initial weight – new weight
   220- 198.8 = 21.2 lbs

SPECIAL PROGRAMMING FOR PEOPLE
   Children ➔ 6-17 years of age (60 mins a day)
   Have LOWER anaerobic capacity
   Thermoregulatory systems are more prone to heat injuries
   Target: Endurance (aerobic), muscular strength, bone strengthening

   Elderly ➔ 65+ or medically limited 50-64 age
Problems: Stroke volume and cardiac output declines, anaerobic capacity declines
Water loss, slower reaction time, decrease in muscle fibers and atrophy of type II (fast twitch fibers)
**Endurance is better than power**

**Basically** → help them stay active (delay chronic diseases, enhance cardiorespiratory fitness, prevent limitations) need resistance training as well as balance (static and dynamic)
5 days a week, 30 mins (moderate)
3 days a week, 20 mins (vigorous)

**CVD** → THEY NEED CARDIORESPIRATORY FITNESS
Intense aerobic training
5-7 days a week, 20-60 mins (moderate)
Resistance training → to help with CVD demands, improve muscular fitness

**Pregnant** → always be evaluated by a doctor
Need an extra 300kcal a week for metabolic demands
Breastfeed BEFORE working out, stay hydrated
10-15 min bouts helps, nothing TOO intense
**Avoid** → supine position (orthostatic hypertension)
   Isometric/heavy resistance (NONE)
   No overaggressive stretching

**Diabetes** → Main goal is to control blood glucose levels (less than 126mg)
Want to help them decrease complications, reduce blood pressure, improve cardiorespiratory, muscular strength, reduce body fat
****THEY NEED CONSISTANCY! 3-7 days a week
If they are on meds or obese, DAILY exercise is key
50% of MaxHR, 20-60 mins
**NOTHING** too high impact, DON’T workout late
MAXIMIZE caloric expenditure

**Hypertension** → the silent killer
Goal: Lower both systolic and diastolic
NEED aerobic activity EVERYDAY if possible
30-60 mins a day, 40-60% of MaxHR
   Aerobics is key / Cool downs are a must

TRANSTHEORTEICAL MODEL

**Pre-Contemplation:** Client really isn’t thinking about the benefits or taking action towards fitness
**Contemplation:** The client sees that changes should be made and considers the negative consequences of their behavior
Preparation: Client has a plan of action and will implement the changes within 30 days (may need help planning)
Action: Client is actively making changes (less than 6 months) (may need help problem-solving)
Maintenance: Client is working on the prevention of relapse

RISK STRATIFICATION
High – CVD, asthma, lung disease, cystic fibrosis, diabetes, renal disease (also, if they show risk factors that suggest there is something wrong – dizziness, pain, shortness of breath after mild exertion, ankle edema, known heart murmur)
Moderate – Hypertension, having two risk factors (smoking, prediabetes, age, family history, obesity, dyslipidemia)
Low- only 1 risk factor (that is not listed on high risk sheet)

Exam for Low – Nothing for doctor or pre-exercise or supervision
Exam for Moderate – vigorous exercise for doctor, nothing for pre-exercise or supervision
Exam for High – need EVERYTHING done → doctor for any exercise, pre-exercise for any exercise, and supervision through it all

THE SPINE
Spine Curves
Cervical and Lumbar: Lordosis
Sacral and Thoracic: Kyphosis
Lateral deviation: Scoliosis

(7, 12, 5) → # of vertebrae in cervical, thoracic, and lumbar

***TIP: Think of eating times: 7am for breakfast, 12 for lunch, 5pm for dinner

SITS MUSCLES
Supraspinatus → Abduction of humerus / stabilization
Infraspinatus → extension and lateral rotation of humerus
Teres Minor → “^”
Subscapularis → Adduction and medial rotation of humerus

ADVANCED TRAINING/PROGRAMMING
Resistance training → Heavy & forced negatives, functional isometrics, partial repetitions, variable resistance, forced reps, breakdown sets, combining exercises, discontinuous sets, quality training, and spectrum repetition/contrast loading combinations
Heavy and Forced Negatives → Targets ECC training
Always use precaution when doing ECC (for muscle damage)
For hypertrophy and adv. Strength
**EX:** Bench press → lower it down slowly then have someone help you get it back up.

**Functional Isometrics** → To increase dynamic strength
Perform near STICKING POINT (weak point)
Basically the opposite of Forced Negative
**EX:** Strict press → push bar up, then bend elbows (sticking point) and hold it for a few seconds, then lower a little more and hold

**Partial Repetitions** → Performed with limited ROM
Can be used for hypertrophy or dynamic sets
Many can first do traditional movements and then incorporate partial
**EX:** Bench Press → pushing the bar up, lowering it half way, then pushing it back up

**Variable Resistance Training** → Alternate loading throughout the ROM by using elastic bands and chains
**EX:** On a bench press, you have chains on your rack. When you push up (CON) the chains weigh it down. On the lowering (ECC), the chains weight is lessened.

**Forced Repetitions** → Going beyond your capacity (with a spotter)
Can be used at any level, but are most effective in advanced training

**Contrast Loading** → Different weight after sets with different reps
Used to increase hypertrophy
**EX:** Have 5 sets. First 2 go heavy with 5 reps, then 2nd 2 go moderate for 10 reps, then 1 low for 20 reps

**Breakdown Sets** → Made to increase hypertrophy and endurance
Set a number of reps and decrease the weight (Like Kegan)
**EX:** Start heavy and do 5 reps, then take 10% off and do another 5, then take 10% off again and do 5 more

**Combining Exercises** → performing 2 to 3 exercises consecutively
Muscular strength may increase, but it’s mostly for endurance
**EX:** Thrusters – a clean off the floor, a squat, and then a push press

**ALSO**

**Supersets** → consecutive performance of two exercises either from the same group of muscles or different (Body builders usually do same muscles, athletes usually do separate muscles)

**Tri-sets** (3 exercises) and **Giant set** (4 or more)

**Quality Training** → Involves reducing rest intervals within specific loading/volume parameters as training progresses

**Discontinuous Sets** → Sets that include rests between reps

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**STARTING A BUSINESS**

6 Business Models
1. **Sole Proprietorship** → One owner of the business (just need license)
   2 set backs: Start up capital and personal liability of incurred debt
2. **Independent Contractor** → Service for a business or individual
   Can work at multiple places, set their own hours, paid by session

3. **Partnership** → More than one owning the business
   Allows for a bigger money pool, resources, and talents
   However, you are liable for one another

4. **Corporation** → Formal business entity subject to laws, regulations, and stockholders. It's completely separate from its owners.
   Ownership is more easily transferred than ownership in a partnership or sole proprietorship

5. **S Corporation** → Small chapter corporation (better for small business)
   Benefits include: Limited risk and exposure of personal assets
   No double taxation of both salary and business income
   Freedom for each partner to distribute dividends

6. **Limited Liability Company** → Flexible for small/medium size business
   More advantageous than partnerships or S-Corporations
   Articles of Organization can be filed with the Office of the Secretary of State
   Many Personal Trainers use this

***TIP: When you first start a business, you NEED a Comprehensive Demographic analysis

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**BLOOD PRESSURE:**

- **Normal blood pressure** → 120/80 and LESS
- **Pre hypertension** → between 121/81 and 139/90
- **High blood pressure/hypertension** → 140/91 and up

Systolic pressure → TOP number (max pressure)
Diastolic pressure → BOTTOM number (rest pressure)

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**CONCENTRIC AND ECCENTRIC**

**For Exam:**

- Running uphill → quads contract CONCENTRICALLY
- Hamstrings contract ECCENTRICALLY
- Running downhill → OPPOSITE OF ABOVE

***TIP: Think of stretching when thinking of concentric and eccentric movements. If you are bending your knee, you are eccentrically using your quad (like a quad stretch)

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**CALORIES**

- In a pound → 3,500
- In a macronutrient → Protein: 4  Fat: 9  Carbs: 4  Alcohol: 7 (probably won’t need)
**Glucose Levels:**
- Resting: Between 70-100
- Pre-diabetes: 100-125
- Diabetes: 126 and above

**Cholesterol Levels:**
- Total: No more than 200 (total serum should not be over 5.2)
- Triglycerides: No higher than 150
- LDL (bad cholesterol) should be around 100 (no more than 120)
- HDL (good cholesterol) should not be lower than 35
  ***if HDL is more that 60, it's a POSITIVE factor

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**BLOOD FLOW IN THE HEART**

- **Atria** – Upper chambers
- **Ventricle** – Lower chambers

The **right** side collects the **DEoxyginated** blood (Atria first, then Ventricle) and then pumps it into the lungs
- The **left** side collects the **oxygenated** blood from the lungs and pumps it into the body (Atria first, then Ventricle)
  - The tricuspid is located between the Right Atria and Right Ventricle
  - The bicuspid is located between the Left Atria and Left Ventricle
  - The blood goes into the lungs through the Pulmonary Arteries

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**THINGS THAT MAY COME UP ON THE EXAM**

1) Heart rate **INCREASES LINEARLY** in relation to work rate and oxygen uptake during dynamic exercise
2) INTERNAL INTERCOSTALS cause forceful respiration → they are respiratory muscles
3) TRICEPS BRACHII extend the FOREARM
4) Eccentric → may induce delayed muscle soreness BUT may be good for rehabilitation
5) What describes the systemic approach to learning anatomy? → Anatomy learned according to organ systems
6) What is another term for the body orientation known as inferior? → Caudal
7) What is a commonly used term for cranial orientation? → Superior
8) The transverse plane has a → Longitudinal axis
9) The sagittal plane has a → mediolateral axis (perpendicular to it)
10) The frontal plane has a → anteroposterior axis

***TIP: Plantarflexion is ‘p’ointing the toes (so it is extension)***
11) What movement brings the sole of the foot toward the body’s midline? → Inversion
12) The axial skeleton makes up the → longitudinal axis
13) How many bones make up the skull? → 29 bones
14) What is the mandible (on the skull) good for? → locating the coritod pulse
15) What are the best pulse sites? → radial and brachial
16) The outer, fibrocartilaginous portion of intervertebral discs is called? → Annulus fibrosus
17) What does the Annulus fibrosus do? → Binds the vertebrae from the spine together and resists destructive forces
18) What is a primary, normal curve in the sagittal plane? → Sacral
19) What are Secondary curves? → they are curvatures of the spine that develop as an infant progresses in weight bearing.
20) Which are the secondary curves of the spine? → Cervical and lumbar
21) What is hyperlordosis? → An abnormal cuve, exaggerated anteriorly lumbar curvature
22) Which ribs do not articulate to anything? → Ribs 11 and 12
23) How many pairs of ribs are there? → 12 pairs, 7 pairs are articulated, 5 are not articulated
24) What is the importance of the intercostal space between the true ribs? → It locates the correct placement for electrocardiography electrodes
25) What part of the sternum should you place your hands for CPR? → Xiphoid process (lowest part of sternum)
26) What part of the sternum helps you locate paddle placement for defibrillation? → Manubrium (highest point of sternum)
27) What is the inferior angle of the scapula used for? → skin fold test site for fat assessment

MORE INFO THAT MAY BE ON THE TEST

1. Chest pain and angina – Nitrates and nitroglycerine
   Blood pressure problems – Beta blockers and antihypertensives
   Lipids and cholesterol (LDL) – Antihyperlipidemics
   Blood coagulation – aspirin

2. 90% of fat stored in body connected to glycerol molecule – Triglycerides (TG)
   It is three fatty acids connected to glycerol. Cholesterol and phospholipids are also a part of dietary fat.

3. Saturated fatty acids – single bond (worst one)
   Monounsaturated fatty acids – one double bond
   Polyunsaturated fatty acids—two or more double bonds
4. Hamstrings can contribute to lower back pain. If not stretched through its ROM it can lead to chronic lower back pain

5. Macrominerals – calcium, potassium, magnesium, phosphorus, sulfur, sodium, and chloride. They are MACRO because you need big doses of them
   Microminerals are iron, zinc, manganese, copper, etc. that you only need LITTLE amount of at a time
Minerals, in general, are inorganic substances that assist enzymes to help make the body function

6. Negligence – Failure to conform one’s conduct in a generally accepted duty
   Commission (Or gross negligence) is a conscious act (voluntary)
   Ommision – reckless disregard of the legal duty and of the consequence to the plaintiff
   * So negligence and gross negligence is more of a conduct based problem

7. If someone has heat exhaustion, you should STOP the workout, get them water and electrolytes and have them laying supine with feet elevated

8. Rotation is movement of long bones about their long axis

9. **Work Rate = force x distance**
   If the question asks for Watts, then divide the answer by 6

10. Body Composition = relative proportions of fat and fat-free (lean) tissue

11. Training regularly DOES NOT change your CO (cardiac output). However, it does lower your HR and increases your stroke volume

12. The RPE (Rating of perceived exertion) helps with clients who can’t properly regulate their own HR or have medications that alter their HR. On the Borg Scale (6-20) it should be around a 12-16 for intensity.

13. HIGH Risk factors for CVD (cardiovascular disease) are – age (men over 45, women over 55), smoking, family history of myocardial infarction, hypertension (140/90), Diabetes type 1 for more than 15 years, or type 2 in individuals over 30, and MOST IMPORTANT, your total cholesterol should be LESS than 200mg, or HDL must be MORE than 35 mg!

14. Waist-to-Hip ratio: Men should be NO MORE than .95
    Women should be NO MORE than .86
    WAIST ALONE: Men should be NO MORE than 40 in (should be less than 31 in)
    Women should be NO MORE than 35 in (should be less than 27 in)

15. VITAMINS – Water Soluble = Vit B complex and C
    Need these for everyday life – metabolism!
FAT soluble vitamins = A, D, E, and K and are stored in body fat

16. If elderly begin to work out, their life satisfaction will go up, but not their appetite.

17. Angina - discomfort associated with myocardial ischemia. It means there is insufficient blood flow to one or more arteries. Symptoms can be felt in the chest, arm, neck, and shoulder.

18. Physiological theories provide conceptual framework for DEVELOPMENT, not management of programs. They evaluate effectiveness, NOT measurement of outcomes. All about MOTIVATION and application of COGNITIVE-BEHAVIORAL principles.

19. PNF (Proprioceptive neuromuscular facilitation) can cause residual muscle soreness, is time consuming, and usually needs a partner. If your partner pushes you too hard, injury can happen. This type of stretching deals with the contraction and relaxation of agonist and antagonist muscles. Static stretching is the one most used – hold 10-30s in a slight discomfort position. Ballistic has bouncing involved and can cause muscle soreness or acute injury.

20. Plyometrics → A method of strength and power training that involves an eccentric loading of muscles and tendons followed immediately by an explosive concentric contraction. There is NO significant difference in power improvement when comparing plyometrics with high intensity training. This way might actually CAUSE injury (musculoskeletal).

21. The informed consent document is NOT a legal document

22. ACSM recommends that exercise intensity be prescribed within what percentage of oxygen uptake RESERVE should be 40%-59% and 60-89%

23. ACSM recommends 8-12 reps for strength and endurance training. Should exercise each muscle group 2-3 nonconsecutive days a week


EXTRAS FROM THE TEST

Need to know...
1. **Risk Stratifications**—Know SPECIFICS for the Coronary Artery Disease (CAD) and Cardiovascular (CVD). There are a few questions where they may use the same client but ask didn’t questions regarding this persons medical revue.

2. **Know** HDL carries lipids away from storage and to the liver (*this was on my exam, however yours may ask about LDL or saturated fats)

3. **Know** protein can be turned into fat in the body.

4. **Know** about arm and leg movements when it comes to eccentric and concentric movements (*I had a few questions on this. One had to do with seated leg extension, standing leg abduction, and I think one dealt with an arm curl)

5. **Research** cortisol. It asks a question about it, particularly when it is high.

6. **Calorie intake**—There was a very specific question on a man’s carb intake on a 2,500 calorie diet. Be able to make calculations around how much he can eat, has left to eat, how many carbs he can have, fats he can have, etc. My question was specifically about his carb intake.

7. **Know** what the liability form is called AND what the Privacy sheet is called. (*I believe its HIPAA)

8. **Know** that supplements are the most frequent claims related to the violation of scope practice.

9. **Know** that HDL is seen as a positive in the risk factor scheme if it is above 60.

10. **Know** what can help with colds sometimes (this was one of the odd ones. All I remember is one of the choices being Echinacea, which is what I put)

11. **Models** – The most important one is Transtheoretical, but do brush up on the others! They asked a few different questions concerning those. Know stimulus control and motivational interviewing.

12. **Transtheoretical Model** – One specific question asked which part of the model was this person in- “I really want to start working out but I just don’t have the time.”

13. **Water intake** on a hot day.

14. **Intrinsic and Extrinsic** – They asked two very specific questions on this. KNOW the difference when it comes to your clients.

15. **Muscle strength** – In initial weeks, know what causes muscle strength

16. **Tricuspid** – Know what it SPECIFICILLY does (not just where is it located)

17. **Dull Ache** – If a man complains of a dull ache in the left side of his chest after working out, where is that pain coming from?

18. **High Altitude** – Know what you should be doing if you are working out in this climate

19. **PNF** – Know exactly what is means, not that it’s just one of the stretching techniques

20. **Smoking**—Know exactly what it could do to the body after smoking prior to exercise. (*see what nicotine does to the body)

21. **Spotting technique**—They asked two questions. Not sure if I got them right, but I’m pretty sure you should never just stand there and do nothing.

22. **Children** – Know if kids should be allowed to start resistance training, and know about children in hot weather (more prone to heat injuries)

23. **Pregnant women** – should not be in a supine position. Also know what to do if your client tells you they have become pregnant. What do you do? (*I know two of the choices were to continue doing the usual workout until the 2nd trimester, or have them go to a physician right away to get checked)
24. **Resistance Training** – Had two questions regarding specific types of training (*supersets, pyramid, forced negatives, etc.)*

25. **Bronchial dilators** – Know what they do.

26. **Hypoglycemia** – If someone is experiencing hypoglycemia after a workout, you call the physician. Once the physician is called, what do you do? (*three of the choices where give them insulin, give them an orange juice, or wait till the physician arrives*) (I think answer was give them an orange juice)

27. **Law**—Know what law you are under as a Personal Trainer when someone needs resuscitation methods. Others are under it but you are not. (*one of the answers was the Good Samaritan Law—that's most likely the answer)*

28. **Protein** – Know what a ‘complete’ bond is. (Whether its all the essential amino acids, or just one, etc.)

29. **Absolute and Relative Contraindications** – Know these definitions because they will ask how they differ

30. **Body Fat**—What is the normal percentage for men and women (*keep in mind they could ask you a what the underweight and overweight is as well)*

AND THAT’S A WRAP